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THE LOWER PALAEOZOIC  
BRACHIOPOD AND TRILOBITE  
FAUNAS OF ANGLESEY



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corners. Glabella clavate, reaching to the anterior border, evenly convex (*sag.* and *tr.*); narrowest just behind the midline (*sag.*), just longer than wide; without glabellar furrows. Axial furrows convex inwards, well defined. Occipital ring not seen. Fixigenae incomplete, evenly convex (*long.*), palpebral lobe and course of facial suture not seen. Anterior border not separated from glabella mesially, but present in front of the fixigenae; anterior border furrow well defined, meeting the axial furrow in a right angle, and continuing a little way adaxially to define the anterolateral corner of the glabella. Ornament of coarse terrace lines, averaging five to eight per 5 mm., becoming crowded together on the anterior border, transverse across the glabella, borders and anterior part of the fixigenae, not preserved elsewhere.

Librigena incomplete, triangular, convex (*long.*), with prominent anterolateral border furrow, no posterior border furrows. Eye lobe large, semicircular. Genal spine long, circular in cross-section. Ornament of distant terrace lines, diverging on either side of eye.

TYPE SPECIMENS (measurements in mm.)

		Length	Width
HOLOTYPE.	Incomplete cranidium (In. 58291) . . .	28.8	—
PARATYPES.	Incomplete cranidium (In. 58292) . . .	—	—
	Internal mould and interior of incomplete librigena (In. 58293a-b) . . . . .	—	—

TYPE HORIZON AND LOCALITY. Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy. N.G.R. 30539279.

DISCUSSION. *Protobronteus* was erected by Šnajdr (1960 : 245-246) to include only *Eobronteus reedi* Sinclair (1949 : 51-52). In this species, as in *P. greenlyi* the glabella is clavate, without any glabellar furrows, and coalesces with the anterior border. *E. curtus* Sinclair (1949 : 50-51) is very similar and could well be included in *Protobronteus* as the glabellar furrows are indistinct and the anterior border furrow fades out mesially.

*P. greenlyi* differs from both these species in that the inner anterior border furrow is absent (the cheek furrow of Sinclair 1949 : 51), and the ornament is differently developed. In *P. reedi* the terrace lines are longitudinal between the two border furrows, and in *E. curtus* they are not developed in the same place, only coarse punctae being present.

Family **ILLAENIDAE** Hawle & Corda 1847

Subfamily **ILLAENINAE** Hawle & Corda 1847

Genus **ILLAENUS** Dalman 1827

*Illaeus* sp.

(Pl. 12, figs. 8-13, 15)

1919 *Illaeus caecus* Holm (*partim*); Lake in Greenly : 478.

DESCRIPTION. Cranidium quadrangular, evenly convex (*tr.*), longitudinal convexity strong posteriorly, weak anteriorly. Glabella short and wide, with slight



independent convexity (*tr.*), two-thirds the width of the cranidium. Axial furrows curve inwards for two-thirds of their length, and end in an outwards curve. Palpebral lobes one-third the length of the cranidium, situated less than their own length from the posterior margin. Posterior branches of the facial sutures short, running directly backwards, anterior branches slightly divergent. Dorsal surface of cranidium smooth.

Pygidium parabolic, the anterior margin slightly convex forwards, width four-thirds the length, convex, the inner pleural fields gently convex and the margins deflected at about  $45^\circ$ . Axis short, sub-triangular, with independent convexity (*tr.*), four-tenths the width of the pygidium. Axial furrows shallow posteriorly, meeting at about  $60^\circ$ . Short (*long.*) articulating half ring. Pleural fields with anterior borders slightly swollen, marked off by shallow depressions. Articulating facets sharply bevelled, with terrace lines extending beyond them. Rest of dorsal surface finely pitted. Doublure close to the dorsal shield, convex ventrally at its outer margin, almost half the length (*sag.*) and one-tenth the width of pygidium at anterior margin. Inner margin commencing near midline of facet (*tr.*), swinging in a curve gradually decreasing in radius to the midline of the pygidium, where a forward pointing cusp is found. Ventrally deflected median ridge strongly marked. Doublure bears terrace lines running parallel to its margins about 0.7 mm. apart.

FIGURED SPECIMENS (measurements in mm.)

	Length	Width
Cranidium (In. 58294) . . . . .	—	9.9
Pygidium (In. 58295) . . . . .	23.7	32.7
Pygidium (In. 58296) . . . . .	22.6	33.5

DISCUSSION. The species resembles *Illaeenus revaliensis* (Holm 1886 : 87-92, pl. 2, figs. 1-10) particularly in the shape and other features of the pygidium. The axis is similar, and the inner margin of the doublure has a forward pointing cusp at the midline. The cranidium is poorly preserved, and may possibly be a crushed and distorted cranidium of *Stenopareia* cf. *linnarssoni* (Holm), but the glabella is relatively wider, the palpebral lobes are much larger, and the anterior margin seems to be sharply truncated.

Genus **STENOPAREIA** Holm 1886.

***Stenopareia* cf. *linnarssoni*** (Holm)

(Pl. 12, figs. 14, 16-23)

1919 *Illaeenus caecus* Holm (*partim*); Lake in Greenly : 478)

DESCRIPTION. Cranidium quadrangular, the frontal area domed, strongly and evenly convex (*long.* and *tr.*). Glabella with slight independent convexity (*tr.*), half the length of cranidium. Two pairs of oval muscle scars between the axial furrows, the anterior pair indistinct. Axial furrows poorly defined on dorsal, but well defined on ventral surface, extending forwards half the length of cranidium, widening in their anterior half to be well defined on the ventral surface. Palpebral lobes less than one fifth the length of cranidium, less than their own length from



the posterior border. Posterior branches of facial suture short, straight, running diagonally outwards, anterior branches straight, converging slightly forwards. Glabella and fixigenae with smooth dorsal surfaces, frontal margin with faint terrace lines on the ventral surface.

Librigena twice as long as wide, tapering to a point anteriorly, with vertically deflected border present anteriorly. Genal angle very broadly rounded.

Rostral plate triangular, anterior margin gently convex outwards, the posterior margins concave rearwards, meeting in a central cusp with an angle of less than  $90^\circ$ . Ventral surface with terrace lines.

Pygidium semi-oval, just over half as long as wide, weakly convex except at the sides where almost vertically deflected. Axis one-third the anterior width, undefined posteriorly, evenly convex (*tr.*). Axial furrows shallow, only seen at anterior margin. Dorsal surface smooth. Articulating facets convex, almost vertical. Doublure lies close to the dorsal surface, with a faint median ridge, anterior margin monocuspid(?).

FIGURED SPECIMENS (measurements in mm.)

	Length	Width
Cranidium (In. 58297) . . . . .	15.5	18.6
Cranidium (In. 58298) . . . . .	—	14.6 (est.)
Librigena (In. 58299) . . . . .	19.7	—
Rostral plate (In. 58300) . . . . .	8.9	22.6
Pygidium (In. 58301) . . . . .	23.4	42.4 (est.)
Pygidium (In. 58302) . . . . .	13.5	22.5

HORIZON AND LOCALITY. Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy. N.G.R. 30539279.

DISCUSSION. The cranidium is very similar to that of *Stenopareia linnarssoni* (*Illaenus linnarssoni* Holm in Warburg 1925 : 115–123, pl. 2, figs. 14–18). The glabellar proportions and the axial furrows are the same, with an anterior swelling of the furrows. The palpebral lobes are the same size and equally far back. The pygidia are approximately similar in proportion; the inner margin of the doublure is unknown, though it also has a ventrally deflected median furrow. The facets are narrow and rounded in both cases, but the axis is relatively narrower in the Anglesey specimens. *Stenopareia camladica* Whittard (1961 : 216–217, pl. 30, figs. 10–13) has a similar cranidium, but the axial furrows are poorly preserved, and the pygidium is differently proportioned in the Shropshire species.

Family **HARPIDAE** Hawle & Corda 1847

Genus **SELENOHARPES** Whittington 1950

*Selenoharpes* (?) sp.

(Pl. 13, figs. 1–2, 5–6)

DESCRIPTION. Outline of cephalon oval; greatest width probably behind the occipital ring.

Glabella tapering forwards, width at its base seven-ninths of its length, rounded



anteriorly; sharply convex and carinate, in height equal to its width; in lateral profile becoming vertical anteriorly. Basal lobes triangular, very vague, one-third the length of the glabella, marked by shallow furrows running inwards and backwards. Axial, preglabellar, and occipital furrows all shallow. Occipital ring one-ninth length of the glabella, bent up with it.

Pre-glabellar field one-third length of the glabella, sloping anteriorly. Eye tubercles prominent and elevated above the cheeks, opposite the anterior one-fifth of the glabella. Eye ridges broad, running directly inwards. Genal ridges fine, running outwards and backwards to the girder. Alae one-third the length of the glabella, depressed, marked by semicircular alar furrows. Cheek lobes bent down anterolaterally and laterally. Posterior border with sharply raised convex rim, continuous with a similar rim on the inward side of the prolongations. Cheek roll not separable from the cheeks. Brim equal in width anteriorly to the glabellar length, concave, with a row of prominent pits just inside the rim marking the inner edge of a downward bevel round the rim. Girder smooth, with prominent pits forming a single row on both sides; girder possibly meeting the internal prolongations. Glabella and alae smooth; preglabellar field and cheek lobes anterior and lateral to the eyes with radiating ridges with fine pits between them; on the rest of the cheeks and on the brim are similar fine pits but without ridges or arrangement.

FIGURED SPECIMEN. Incomplete cranidium (In. 58303).

HORIZON AND LOCALITY. Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy. N.G.R. 30539279.

DISCUSSION. The two closest genera are *Selenoharpes* and *Aristoharpes*, the former of Middle Ordovician (post-Llandeilo) age and the latter of Llandovery age. In *Selenoharpes* the glabella tapers forwards, the eye ridges are prominent and genal ridges are present. In *Aristoharpes* the glabella is sub-parallel sided, eye ridges are weak and genal ridges absent. It also has much smaller alae than *Selenoharpes*, which are one-quarter the length of the glabella compared with one-half. There is thus some doubt as to where to place these specimens, which compare closely with *Selenoharpes*, except for the smaller alae, a difference that is probably trivial. The specimens are certainly not conspecific with the type species, *S. youngi* (Reed) from the lower Caradoc of Girvan, in which the brim is convex upwards.

Family **TRINUCLEIDAE** Hawle & Corda 1847

Subfamily **CRYPTOLITHINAE** Angelin 1854

Genus **BERGAMIA** Whittard 1955

*Bergamia* (?) sp.

(Pl. 13, figs. 3-4, 9, 13)

DESCRIPTION. Cephalon twice as broad as long. Glabella pyriform, swollen, tapering markedly posteriorly, second and third furrows fairly well marked, pit-like in form; well marked alae bounded laterally by deep furrows, ending laterally against the posterior border in well marked knobs; glabellar furrows not well marked



against the alae. Genae swollen, crossed by a ridge running obliquely back from the front of the glabella to the genal angle. Occipital ring very narrow, arched and convex posteriorly; posterior borders from a narrow sharp ridge posterior to a wide shallow furrow. Glabella and genae posterior to the ridge bear a strong reticulate pattern, becoming faint towards the front of the glabella. Fringe of uniform width throughout except at the genal angle; pits sunk in deep radial sulci; girder not seen in any of the specimens; sulci number eighteen on each side of the centre-line, with up to four pits in each; interrarial sulci numbers i and ii present; some twin pits.

Thoracic segments not well preserved; axis strongly convex with axial rings convex posteriorly; pleural regions with strong oblique pleural furrows; pleural spines strong and directed posteriorly.

Pygidium over twice as wide as long, triangular in outline; axis tapers at 30° with at least five axial rings, well defined and strongly arched; pleural lobes divided by at least four faintly marked oblique interpleural furrows; anterolateral angles bevelled as an articulating facet; posterior margins with a broad border of uniform width, slightly raised over the centre-line.

FIGURED SPECIMENS. Counterpart moulds of cranidium and pygidium (In. 58304a-b). Length of cranidium (sag.) 3.4 mm., width 7.0 mm. Length of pygidium 1.7 mm., width 4.2 mm.

Counterpart moulds of complete dorsal carapace (In. 58305a-b). Length (sag.) 2.5 mm.

Ventral mould of dorsal carapace (In. 58306) Distorted.

HORIZON AND LOCALITY. Shales, *D. bifidus* zone, quarry 100 yds. north of Gwredog-uchaf farm, Rhodogeidio. N.G.R. 40488628.

DISCUSSION. The preservation of the specimens, in particular of the fringe, is not good enough to make a certain generic identification. However, the simplicity of the fringe suggests that the specimens belong to *Bergamia*, which ranges from the uppermost Arenig through the Llanvirn, and possibly into the Caradoc (Whittard 1955 : 31). The species resembles *B. rhodesi* Whittard (1955 : 32) in the arrangement of the pits on the fringe. The smallest specimen illustrated (Pl. 13, fig. 3) is a meraspid of probably degree two. There is little difference in characters from the larger specimens.

### Family **RAPHIOPHORIDAE** Angelin 1854

#### Genus **AMPYX** Dalman 1827

*Ampyx* sp. (1)

(Pl. 13, fig. 8)

1919 *Ampyx* cf. *domatus* (Angelin); Lake in Greenly : 446.

1955 *Ampyx* sp.; Whittard : 17.

FIGURED SPECIMEN. Cranidium (Af. 824). Length 9.0 mm., width 12.4 mm.



HORIZON AND LOCALITY. Carmel Formation, sandstones on the escarpment 300 yds. west of Bryn Gollen Uchaf. N.G.R. 40558380.

DISCUSSION. This specimen remains the only one collected from the basal grits, and there is nothing that can be added to Whittard's opinion that it probably belongs to an undescribed species.

*Ampyx* sp. (2)

(Pl. 13, figs. 7, 10-12)

1919 *Ampyx nasutus* Dalman; *Lake in Greenly* : 433.

DESCRIPTION. Cranidium quadrilateral in outline, length four-tenths the width, the anterior border very well developed. Glabella pyriform, widest near the anterior end and broadly rounded in front, one-third to one-quarter the width of the cranidium in front, tapering to the occipital ring, exceptionally weakly swollen, overhanging only part of the preglabellar field. One pair of glabellar furrows almost isolating long narrow lobes, the furrows running back parallel to the axial furrows, starting just anterior to the transverse midline of the glabella; alae (cf. Whittard 1955 : 15) crescentic, starting anterior to the glabellar furrows and extending backwards to meet the posterior border furrow, axial and alar furrows faint; glabellar spine at least half as long as the cephalon, circular in cross section, possibly concave dorsally. Fixigenae triangular, gently convex. Facial suture runs in a gentle sigmoidal curve convex outwards as it crosses the posterior border, convex inwards forwards of this and again convex outwards in its anterior third. Occipital ring narrow, occipital furrow shallow, both convex backwards. Posterior border furrow broad and shallow, running obliquely outwards and backwards, but sweeping forwards again near the genal angle; posterior border widening laterally. Pre-glabellar field comparatively long, about one-sixth the length of the cephalon, flattened.

Thorax of six segments, broad and flat. Axis convex, axial rings each with a shallow groove defining small lobes at each side. Pleurae parallel-sided, each with an oblique furrow curved forward at the tip, sharply deflected ventrally at prominent fulcral processes which appear as tubercles. First or macro-pleurae longer than the others with outer margins not deflected but sloping backwards and out to the fulcrum. Other pleurae with blunt terminations.

Pygidium triangular, twice as wide as long. Anterior margin straight, posterolateral borders slightly convex, deflected, with terrace lines parallel to the margins. Axis convex, with narrow articulating half-ring, tapering from one-fifth the width of the pygidium anteriorly to a point at the posterior end, occasionally a few axial rings present. Pleural lobes smooth, except for strongly developed anterior borders, marked off by sharp furrows running obliquely backwards and outwards, becoming concave forwards laterally to meet the anterolateral angle of the pygidium. Prominent fulcral tubercle at the inner end of the articulating facet.



## FIGURED SPECIMENS (measurements in mm.)

	Length	Width
Internal and external moulds of cranidium (In. 58307a-b)	16.0	35.6 (est.)
External mould of cranidium (In. 58308)	—	—
Internal mould of thoracic segments and pygidium (Af. 3653)	16.3	19.3
External mould of pygidium (In. 58309)	7.0	16.8 (est.)

HORIZON AND LOCALITY. Tandinas shales, by the track leading down to the quarry, and on the shore behind the power house, at Tandinas quarry, Careg-onen. N.G.R. 58248187.

DISCUSSION. The species is similar to *A. linleyensis* Whittard of the Shelve area (*D. bifidus* zone), but differs in having a short, weakly swollen glabella, a pre-glabellar field, and having terrace lines on the pygidium. *A. salteri* Hicks (*D. extensus* zone?) also has terrace lines to the pygidium, but lacks a pre-glabellar field.

Family **CHEIRURIDAE** Salter 1864

Subfamily **CHEIRURINAE** Salter 1864

Genus **CERAURINELLA** Cooper 1953

*Ceraurinella* sp.

(Pl. 13, figs. 14-22)

DESCRIPTION. Cranidium roughly triangular in outline, broader than long. Glabella evenly convex (*tr.*), gently convex (*sag.*) becoming more convex along the anterior lobe. Length equal to the maximum width, the latter across the anterior lobe, sides slightly tapering towards the occipital ring, front margin convex forwards. Three pairs of narrow well marked glabellar furrows; 1p inclined obliquely backwards, bent back to join the occipital furrow nearer the midline than the axial furrows; 2p and 3p parallel to each other, curving obliquely backwards and crossing one-third the width of the glabella (*tr.*). Basal lobes with independent convexity, one and a half times the length (*exsag.*) of the second and third lobes; the latter subequal in length without independent convexity. Occipital furrow not well seen, shallow. Fixigenae triangular convex, eye lobe on the highest part, opposite and close to the second glabellar lobe, equal in length to that lobe (*exsag.*). Anterior part of fixigenae parallel sided, anterior branch of facial suture running in to meet the axial furrows just in front of 3p glabellar furrows. Posterior branch of facial suture runs transversely out from the eye, and curves round to meet the anterolateral border of the cranidium. Posterior border furrows deep and wide, bending sharply forwards to meet the lateral border furrow. Posterior border widening laterally towards genal spine, length of latter unknown. Glabella and borders smooth, fixigenae coarsely tuberculate. Librigenae unknown.

Hypostome slightly longer (*sag.*) than maximum width (*tr.*) across anterior wings,



tapering backwards to a width at the posterior border half the maximum. Median body convex (*sag.* and *tr.*) widest in front of anterior wings. Anterior, lateral and posterior border furrows broad and shallow. Middle furrows faint, running in from opposite shoulders to end in shallow pits. Posterior lobe crescentic, independently convex where marked off by the middle furrows. No anterior border medianly. Anterior wing slopes steeply dorsoposteriorly, tip narrow and spine-like. Lateral border commences opposite anterior wing, widens rapidly to prominent and sharp shoulder (in ventral view) which is just less than half the way back (*exsag.*) from the anterior border, continuous with the posterior border. Short denticle or spine on the posterolateral corners, posterior border straight. Posterior wing not seen. Entire surface smooth.

Thorax of unknown number of segments. Axis arched, most sharply convex over the midline, length (*sag.*) one-fifth the width, width one-quarter that of the whole segment. Anterior margin convex forwards over the midline, concave forwards laterally above the apodemes, which are deflected ventrally (no articulating half-ring seen). Inner part of pleura horizontal, divided in two by a furrow parallel to the axial furrow, the inner part being one-third the width of the whole, and crossed by a diagonal furrow, the outer part bent abruptly ventrally and forming a gradually tapering pleural spine. No ornament on the segments.

Pygidium poorly preserved. Convex axis with four axial rings, or three axial rings and an articulating half ring. Margin not preserved, except for one long tapering spine probably commencing opposite the second axial ring and curving backwards towards its tip. No ornament present.

FIGURED SPECIMENS (measurements in mm.)

	Length	Width
Incomplete glabella (In.58310) . . . . .	—	8.7
Incomplete glabella (In.58311) . . . . .	—	10.3
Incomplete cranidium (In.58312) . . . . .	13.6	—
Hypostome (In.58313) . . . . .	—	—
Hypostome (In.58314) . . . . .	7.9	5.4
Hypostome (In.58315) . . . . .	—	9.1
Thoracic segment (In.58316) . . . . .	—	—
Thoracic segment (In.58317) . . . . .	—	—
Incomplete pygidium (In.58318) . . . . .	—	—

HORIZON AND LOCALITY. Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy. N.G.R. 30539279.

DISCUSSION. The specimens are assigned to *Ceraurinella* since the eyes are opposite the 2p lobes and near the glabella, the genal spines though not complete are short, the pygidium has the long spines typical of that genus (and *Ceraurus*), and the thoracic segments and hypostome also are of the same type. The species described by Cooper (1953 : 29-30) and by Whittington & Evitt (1953 : 62-70) differ in their ornament, which is more pervasive, and possibly also in other minor details. None of the species of *Ceraurus* (Raymond & Barton 1913; Barton 1913)



corresponds. *Ceraurinella?* sp. has been recorded by Whittington from the Derfel limestone (*in* Whittington & Williams 1955 : 422-423, pl. 40, figs. 102, 107 and 111), but the two species are not the same, as in his figures the eyes, not preserved, cannot have been farther back than opposite the 3p glabellar lobes, and the 3p lobes seem to be longer (*sag.*) than the others.

Subfamily **SPHAEREXOCHINAE** Öpik 1937

Genus **SPHAEREXOCHUS** Beyrich 1845

*Sphaerexochus* sp.

(Pl. 14, figs. 1-2)

DESCRIPTION. Cranidium only preserved, distorted by flattening, crescent shaped in outline, original convexity not known. Glabella subcircular to pentagonal in outline, widest opposite the second glabellar furrow (2p). Occipital ring narrower than the glabella at its maximum, one-eighth of glabella length (*sag.*), convex, posterior margin concave backwards. Occipital furrow broad and deep, uniformly curved throughout. First glabellar furrows (1p) transverse with a gently concave backwards curve, curving sharply at their inward ends towards the occipital furrow, running to meet it in another gentle curve convex sagittally. The first lateral glabellar lobes isolated, subquadrate in outline, possibly without independent convexity, four-ninths the length of the glabella (*sag.*), approximately two-ninths its width. Second glabellar furrow (preserved only on one side) very short, straight. Second glabellar lobe one-half length of the first. No third glabellar lobes or furrows. Anterior border not preserved. Fixigenae small, triangular, convex. Palpebral lobe very narrow, opposite to 1p furrow, two-thirds the length of the first lobes. Facial suture not seen forward of the eye. Posterior branch runs outwards and then backwards to meet the posterior border at right angles. Posterior border equal in width to the occipital ring at its inner end, widening towards the genal angle. Posterior border furrow concave forwards, dying out towards the genal angle.

FIGURED SPECIMEN (measurements in mm.)

	Length	Width
Cranidium (In. 58319)	6.0 ( <i>sag.</i> )	9.5

HORIZON AND LOCALITY. Tandinas shales, on the shore by the powerhouse, 100 yds. west of the pier, Careg-onen. N.G.R. 58208193.

DISCUSSION. The specimen differs from all described species of *Sphaerexochus* by having two pairs of lateral glabellar furrows. *S. bilobatus* (Whittard 1958 : 110) has only the basal pair developed, otherwise three pairs seem to be the rule. The preservation of the specimen has resulted in accentuation of the anterior furrow on one side, and its obliteration on the other. It is possible, though unlikely that a third pair of furrows may be present, but obliterated.



Family **PLIOMERIDAE** Raymond 1913

Subfamily **PLIOMERINAE** Raymond 1913

Genus **PLIOMEROPS** Raymond 1905

*Pliomerops* sp.

(Pl. 14, figs. 3-4, 6-7)

DESCRIPTION. Cranidium incomplete. Glabella quadrangular, expanding forwards from the occipital ring to midway between the pre-occipital and middle furrows, forwards of this having a domed margin, slightly flattened in the centre. Dorsal furrows deeply impressed. Pre-occipital furrows (1p) commencing at one-third the length of the glabella forwards from the occipital ring, running obliquely inwards and backwards for one-quarter the width of the glabella, at that point turning abruptly to run slightly forwards, finally curving round to point obliquely backwards at their inner tips, which are separated by one-eighth the width of the glabella. Middle furrows (2p) commencing just forwards of two-thirds the length of the glabella, running inwards and backwards to as near the midline as the pre-occipital furrows, the tips of the inner ends of the two pairs of furrows being much closer together than their outer ends. Anterior furrows (3p) located on the anterior margin, half way between the midline and the anterolateral corner of the glabella, faint and short, being little more than indentations of the margin. Rear two pairs of glabellar lobes with independent convexity. Axial furrows of the same depth as the glabellar furrows, curving smoothly into the anterior border furrow. Occipital furrow convex forwards at centre, becoming concave forwards towards the axial furrows. Occipital ring not completely preserved, lengthening (sag.) towards the midline. Anterior border strongly arched dorsally over the midline, widest at the midline and at the anterolateral angles of the cephalon. Fixigenae incompletely preserved.

Hypostome shield-shaped, anterior border convex, lateral and posterior borders with a sigmoidal curve ending in a posterior point, slightly wider than long, almost flat. Middle body of same shape. Anterior lobe produced into lateral wings, posterior lobe crescentic, defined by middle furrows commencing just behind the wings, broad and shallow, curving gradually inwards. Anterior border poorly preserved, widest at the anterior wings. Lateral and posterior borders of uniform width except at their anterior ends. All border furrows wide and shallow.

Pygidium with shape of an extremely taut bow, just longer than wide, anterior margin very convex forwards. Convex (*tr.*), the margins deflected ventrally at angles up to 90°, almost flat (*sag.*), but convex (*exsag.*). Axis convex, of five flat-topped (*sag.*) axial rings, tapering backwards, followed by a terminal axial piece one and one half times as long as the rings, parallel sided for half its length and tapering to a point in the posterior half. Pleural portions of five pleural lobes, without a border, each lobe widening to the margin and truncated to produce a smooth lateral and posterior border; the last pair surrounding the axis and separated by a median furrow.



## FIGURED SPECIMENS (measurements in mm.)

	Length	Width
Incomplete cranidium (In. 58320) . . . . .	16.5	—
Hypostome (In. 58321) . . . . .	14.5	—
Pygidium (In. 58322) . . . . .	39.0	—
Internal mould and interior of pygidium (In. 58323a-b) . . . . .	—	17.0 (est.)

HORIZON AND LOCALITY. Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy. N.G.R. 30539279.

DISCUSSION. The above descriptions are of isolated pieces from the limestone blocks, and, assuming they belong together, they are assigned to the genus *Pliomerops* Raymond on the basis of the diagnosis given by Harrington (*in* Moore 1959 : O 440). The anterior border is not denticulate, there is no median indentation of the glabella, and the terminal axial piece is long and enclosed. The cranidium resembles that of *P. canadensis* (Billings) illustrated in the Treatise (Moore 1959 : fig. 345, 2b) but the pygidia do not. As far as can be seen, most of the described species of *Pliomerops* have short terminal axial pieces and usually a denticulate margin, though the diagnosis in the Treatise (Moore 1959 : O 440) states that the terminal axial piece is long. Reed (1906 : 153, Plate XIX, fig. 16) figures a pygidium very like this as *Pliomera* sp.

B. N. Cooper (1953) has described a pliomerid from Virginia, *Pliomerella americana*, which is somewhat similar to the Anglesey specimens. The pygidium appears to be identical, to judge from Pl. 10, fig. 4 of his paper. This is a crushed specimen, but the long axial piece is apparently enveloped by the posterior pleurae. Another pygidium is illustrated in fig. 1 of the same plate, in which the terminal axial piece is quadrate and reaches the posterior margin, though it may be that the posterior part is missing, and the caption states that the specimen is incomplete. Cooper's text does not indicate whether the axial piece is enveloped or not, and the specimen of his Pl. 10, fig. 1 is re-illustrated on p. O 445 of the Treatise (Moore 1959 : fig. 348, 2b) as being in fact complete. The accompanying text in the Treatise (Moore 1959 : O445) states that a pygidium of this sort is diagnostic of *Pliomerella*. The genus was erected by Reed (1941 : 269) for trilobites with two pairs of glabellar furrows 'combined with some characters of *Pliomera*', but he did not describe a pygidium. It is thus probable that *Pliomerella americana* Cooper does not belong to *Pliomerella*, but possibly to *Pliomerops*, though there is no sign in Cooper's figures of the anterior glabellar furrows, nor does he describe them in the text.

Subfamily **PLACOPARIINAE** Hupé 1953

Genus **PLACOPARIA** Hawle & Corda 1847

*Placoparia* sp.

(Pl. 14, fig. 5)

1919 *Placoparia* sp.: Lake *in* Greenly : 466.

FIGURED SPECIMEN. Dorsal carapace (Af. 1319). Length 23.1 mm.



HORIZON AND LOCALITY. Shales of the *Gl. teretiusculus* zone, 80 yds. north of the streamlet, on the shore at Porth-y-gwichiaid (Greenly 1919 : 466). N.G.R. 48799160.

DISCUSSION. The species *P. zippei* (Boeck) has recently been divided into two species, *P. zippei* and *P. barrandei* Prantl & Šnajdr, differing in a number of small features, including the glabellar shape, details of the glabellar and ocular furrows, and the development of vincular notches (Whittard 1966 : 283-284). *P. barrandei* itself is a synonym of *P. cambriensis* Hicks (1875 : 186, pl. 9, figs. 1-2) (Dr. W. T. Dean, personal communication).

The Anglesey specimen belongs more probably to *P. cambriensis*, as the glabella is quadrate rather than trapezoidal in outline, though the evidence of the other features is equivocal, probably due to crushing of the specimen.

Family **CALYMENIDAE** Burmeister 1843

Subfamily **CALYMENINAE** Burmeister 1843

*Calymenid* undet.

(Pl. 14, figs. 8-9, 12-13)

FIGURED SPECIMENS (measurements in mm.)

	Length	Width
Hypostome (In. 58324) . . . . .	6.7	5.6
Pygidium (In. 58325) . . . . .	9.3	11.5

HORIZON AND LOCALITY. Garn Formation, limestone blocks in breccia bed, Porth Padrig, Mynachdy. N.G.R. 30539279.

DISCUSSION. The material found consists of one complete pygidium, and one complete and one incomplete hypostome. It is assumed that they all belong to one species.

The pygidium is oval in outline, and strongly convex. The axis gradually tapers backwards, not reaching the posterior border, with six well defined axial rings, a terminal piece and an articulating half ring. The pleural portions show deep pleural furrows with much shallower interpleural furrows, extending to the margin but becoming much fainter on the border. The border is marked by faint depressions running from the tip of the axis to the anterior margins. There are well defined and almost vertically deflected articulating facets, with the foremost pleural groove extending onto them. In posterior view the lateral and posterior margins show a strongly marked arch across the midline. The entire surface, except for the articulating facets and the furrows, is finely tuberculate.

The hypostome is longer than wide, rectangular in outline. The middle body is parallel-sided, with faint diagonal middle furrows dividing off a crescentic posterior lobe, convex longitudinally and sharply convex transversely, without a raised central portion to the anterior lobe. The anterior border is flexed ventrally, continuous with large anterior wings. The lateral borders have a wide gently curved notch extending from the anterior wings to opposite the anterior end of the posterior lobe. The lateral and posterior borders behind this are wide and flat, produced



into points almost one-third of the length of the hypostome, separated by a deep median notch extending to the end of the middle body. The tips of the points and the notch are all sharp, each with an angle of about  $50^\circ$ .

Subdivision of the Calymeninae is based mainly on cephalic characters, so it is not possible to give a generic designation. The upper Ordovician calymenid species have been assigned to five different genera by Shirley (1936 : 400), and of these *Platycalymene*, *Gravicalymene* and *Flexicalymene* agree in their pygidial characters. *Flexicalymene* is the closest in character, and the pygidium described and figured by Shirley (1936 : 406, pl. 29, fig. 7) looks similar, though it is more angular in outline.

Family **HOMALONOTIDAE** Chapman 1890

Subfamily **EOHOMALONOTINAE** Hupé 1953

Genus **NESEURETUS** Hicks 1872

*Neseuretus monensis* (Shirley)

(Pl. 14, figs. 11, 16)

1919 *Calymene parvifrons* Salter; *Lake in Greenly* : 442, 446.

1919 *Calymene tristani* Brongniart; *Lake in Greenly* : 442.

1936 *Synhomalonotus monensis* Shirley : 401.

FIGURED SPECIMENS (measurements in mm.)

	Length	Width
Internal and external moulds of pygidium (In. 58326a-b)	16.9	21.0 (est.)
Internal mould of pygidium (In. 58327)	distorted	

HORIZON AND LOCALITY. Carmel Formation, sandstones; In. 58326a-b from 440 yds. north of Ty-hen, Treiorwerth, N.G.R. 35767891; In. 58327 from 120 yds. north-west of Chwaen-bach, Llanerchymedd, N.G.R. 39468378.

DISCUSSION. Shirley described this species from specimens in Greenly's collection (G.S.M. Af. 930-2). The thorax, librigenae and pygidium were not represented in the collection, so only the cranidium was described. Pygidia have been found from the same horizon, and give additional information on the species. The specimen from Chwaen-bach is distorted, and the description is based on that from near Ty-hen (In. 58326).

The pygidium is broader than long, roughly elliptical but with the anterior margin more strongly curved than the borders. The axis bears an articulating half ring and furrow. The axis is funnel-shaped, the tapering portion containing at least six rings, followed by an almost cylindrical portion terminating in a rounded end not quite reaching the posterior margin. The pleural lobes are gently convex, and bear six rounded unfurrowed pleurae, separated by well marked interpleural furrows. The border is sharply rounded, but the form of the doublure is unknown. The pygidium from Chwaen-bach shows pleural furrows which may be the result of crushing.



Family **LICHIDAE** Hawle & Corda 1847  
 Subfamily **TETRALICHINAE** Phleger 1936  
 Genus **AMPHILICHAS** Raymond 1905

*Amphilichas* sp. (1)

(Pl. 14, figs. 10, 14-15, 17)

**DESCRIPTION.** Cranidium roughly pentagonal, strongly bent down at the anterior and posterior lateral corners. Glabella rounded, axe-shaped, as broad as long, strongly convex, overhanging in front. Frontero-median lobe prominent, expanded in front to more than twice its basal width; anteriorly strongly convex; anterior lateral angles rounded; posteriorly parallel sided and less convex. First lateral (longitudinal) furrows run inwards towards centre of lobe, curving steadily round to become parallel and meet the occipital furrow at right angles. Lateral lobes gently convex, a little less elevated than the median lobe; bluntly pointed in front, strongly bent down with the antero-median lobe; posterolateral angles extend considerably further back than the median lobe. Axial furrows as strong as longitudinal furrows, posteriorly parallel to them, diverging slightly in front of the eyes. Occipital furrow straight and horizontal behind median lobe, directed obliquely backwards behind the lateral lobes, and less obliquely behind the fixigenae. Occipital ring not completely preserved but possibly widest behind the median lobe. Fixigenae posteriorly equal in width to the lateral lobes, narrowing to less than half that width opposite the eye; expanding in front of the eye; expanding in front of the eye but not completely preserved. Course of facial suture only seen round eye, running outwards behind it. Palpebral lobe semicircular, convex inwards; its length is one-fifth that of the glabella and its posterior end level with the occipital furrow. Entire cranidium, except for the furrows, covered with tubercles of varying size, irregularly placed.

Hypostome oval in outline, broader than long. Posterior border broad, posterior margin indented. Middle body circumscribed. Posterior lateral lobes well defined by median furrows running inwards slightly posteriorly with short bifurcations at their inner ends. Lateral borders broad, with short triangular wings opposite the posterior border furrow. Anterior border appears to be lacking. Anterior part of middle body pitted; anastomosing ridges or terrace lines on remainder of surface.

FIGURED SPECIMENS (measurements in mm.)

	Length	Width
Incomplete cranidium (In. 58328)	14.9	—
Hypostome (In. 58329)	5.8 (sag.)	7.9

**HORIZON AND LOCALITY.** Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy. N.G.R. 30539279.

**DISCUSSION.** No thoracic segments have been found, and the only remains of pygidia so far found are too incomplete to describe; they only show the typical development of tubercles. The cranidium shows similarities to *A. wahlenbergi*



Warburg from the *Leptaena* Limestone in Dalarne, and also to *Lichas* (*Amphilichas*) *hibernicus* (Portlock) (Reed 1906 : 106, pl. 15, fi. 1 non 2-3).

*Amphilichas* sp. (2)

(Pl. 14, figs. 18-19)

DESCRIPTION. Outline possibly semicircular, weakly convex both longitudinally and transversely, probably crushed. Frontero-median lobe convex, expanding forwards to over twice its posterior width; the longitudinal furrows being parallel posteriorly and curving outwards to diverge at more than  $90^\circ$  where they meet the axial furrow, not reaching the occipital furrow but ending in a pit. Tricomposite lobe widening very slightly forwards, at its posterior end the same width as the median lobe posteriorly; axial furrows concentric with the longitudinal furrows but with smaller radius of curvature. Fixigena incomplete, narrow, posterior to the eye less than half the width of the tricomposite lobe, cut into by the eye lobe, which is one-fifth the length of the cranidium. Only a fragment of the occipital ring preserved. Surface evenly pitted.

FIGURED SPECIMEN (measurements in mm.)

	Length	Width
Incomplete external mould of cranidium (Af. 3000) . . . . .	17 app.	—

HORIZON AND LOCALITY. Tandinas shales, by the track 50 yds. west of Tandinas quarry, Careg-onen. N.G.R. 58248187.

DISCUSSION. There appear to be no basal lobes, so that the specimen belongs to *Amphilichas*, although there is little to compare closely with *Amphilichas* sp. (1) from Porth Padrig.

Family uncertain

Genus **MONELLA** nov.

DIAGNOSIS. Genus similar to *Glossopleura* Poulsen, but differing in having more strongly marked glabellar furrows, the anterior ends of the palpebral lobes not touching the glabella, and eleven (compared with eight) thoracic segments.

TYPE SPECIES. *Monella perplexa* sp. nov. from the Carmel Formation.

DISCUSSION. The specimens assigned to the new genus were referred by Lake (*in* Greenly 1919) to *Ogygia*, but certainly do not belong to the suborder *Asaphina*. The thorax consists of eleven segments and the glabella is distinctly furrowed, a combination of characters that is quite different from any contemporary trilobites, but generally characteristic of the Order *Corynexochida*, though the rostral plate and hypostome have yet to be found. The glabella is clavate and reaches the anterior margin, the eyes are large and semicircular, with prominent palpebral lobes, though eye ridges are not present. The closest genera are found in the family Dolichometopidae, of the order *Corynexochida*. *Athabaskiella* has a similar cephalon, but a smaller pygidium with only four segments differentiated in the pleural regions



and fewer in the axis. *Bathyuriscus* has smaller eyes which are not semicircular, and a very narrow border to the pygidium. *Dolichometopsis* has a pygidium without a border and with a terminal indentation, and *Glossopleura* has very faint glabellar furrows, only eight thoracic segments, and differs in the position of the palpebral lobes.

*Monella perplexa* gen. et sp. nov.

(Pl. II, figs. 15-21)

1919 *Ogygia* sp. (*pars*); Lake in Greenly : 446.

DIAGNOSIS. As for genus.

DESCRIPTION. Outline ovate, cephalon larger than pygidium. Cephalon semicircular, over twice as broad as long. Glabella clavate, between one and one-quarter and two times as long as broad, convex transversely and slightly convex longitudinally; glabellar lobes with independent convexity; three pairs of glabellar furrows, one quarter the width of the glabella, shallow at their abaxial ends; posterior pair (1p) at one quarter the length of the glabella forwards, inclined obliquely backwards and becoming shallower and wider at their adaxial ends; 2p inclined slightly backwards, situated just forward of half the length of the glabella; 3p transverse or slightly inclined forwards, nearer 2p than the front of the glabella; anterior margin of glabella convex forwards, lateral margins and the distinct axial furrows evenly and gently convex adaxially, with well marked fossulae midway between 3p and the front of the glabella. Occipital ring continues the convexity of the glabella, one sixth its length (*sag.*); occipital furrow distinct. Fixigenae smaller than the glabella or the librigenae. Palpebral lobes semicircular, posterior extremities just anterior to the base of the glabella; anterior extremities between the 2p and 3p furrows, separated from the axial furrows at each end by one-third the width of the glabella. No preglabellar field. Anterior border furrow narrow, anterior border with a vertically deflected margin. Facial sutures opisthoparian, posterior branches diverging backwards to cut the posterior margin midway between the axial furrow and the genal spine; anterior branches run directly forwards from the eye to the margin. Librigenae convex, genal spine equal in length to the glabella. Posterior border straight to the facial suture, then curving abaxially from it evenly round to the genal spine; posterior and lateral furrows well defined, posterior border half the width of the occipital ring (*sag.*); the lateral border with a vertical deflection. Doublure wide.

Hypostome and rostral plate unknown.

Thorax of eleven segments. Axis cylindrical, tapering slightly, equal in width to the pleural regions, articulating half-rings equal in length (*sag.*) to the axial rings; interpleural furrows curving slightly forwards towards the axial furrows. Pleural regions flat adaxially, deflected ventrally in their abaxial regions; pleural furrows transverse, dying out between fulcra and extremities; short, backwardly directed pleural spines formed by the extremities of the pleurae being tapered.



Anterior three(?) segments narrower (*tr.*) than the rest and undeflected at their ends.

Pygidium semicircular. Axis convex, tapering to a point and extending onto the border but not reaching the posterior margin, eight or possibly more axial rings present. Pleural lobes gently convex with pleural furrows only. Border broad, concave, doublure equal to it in width.

TYPE SPECIMENS (measurements in mm.)

		Length	Width
HOLOTYPE.	Counterpart moulds of complete dorsal carapace (Af.827-8)	—	13.7
PARATYPES.	Internal mould of cranidium (Af.834)	—	—
	Internal mould of cranidium (Af.836)	—	—
	Internal mould of pygidium (Af.839)	—	—

OTHER FIGURED SPECIMEN

	External mould of incomplete dorsal carapace (In.58290)	—	—
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TYPE HORIZON AND LOCALITY. Carmel Formation, sandstones in old quarry (now filled in), 400 yds. north-north-west of Bryn Gollen Uchaf, Llanerchymedd. N.G.R. 40508425. Other figured specimen from same horizon, on the escarpment 50 yds. north-east of Prys-owain-bach, Carmel. N.G.R. 38878283.

DISCUSSION. The generic position of *M. perplexa* has already been discussed, and it is at present the only species known of the genus.

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PLATE 1

*Hesperonomiella carmelensis* sp. nov.

Carmel Formation, sandstones 50 yds. north-east of Prys-owain-bach, Carmel.

- FIG. 1. Latex cast of ventral interior. BB.30531.  $\times 1.4$ .  
FIG. 2. Latex cast of ventral interior. BB.30530.  $\times 1.5$ .  
FIG. 3. Internal mould of pedicle valve. BB.30532a.  $\times 1.5$ .  
FIG. 4. Holotype, latex cast of dorsal interior. BB.30529.  $\times 1.5$ .  
FIG. 5. Latex cast of ventral exterior. BB.30532b.  $\times 1.6$ .  
FIG. 6. Latex cast of dorsal exterior. BB.30533.  $\times 1.3$ .

*Monorthis typis* gen. et sp. nov.

Treiorwerth Formation, sandstone 300 yds. south-east of Ffynnon-y-mab, Trefor.

- FIGS. 7, 8. Holotype, internal mould and latex cast of brachial valve. BB.30534.  $\times 3.4$ .  
FIG. 9. Latex cast of dorsal interior. BB.30535a.  $\times 4.7$ .  
FIG. 10. Latex cast of dorsal exterior. BB.30535b.  $\times 3.2$ .  
FIGS. 11, 12. Internal mould and latex cast of pedicle valve. BB.30536a.  $\times 3.2$ .  
FIG. 13. Latex cast of ventral exterior. BB.30536b.  $\times 3.2$ .

*Orthambonites*(?) sp. (1)

Nantannog Formation, gritty shales 220 yds. west of Fferam-uchaf, Llanbabo.

- FIGS. 14, 17. Latex cast and mould of dorsal interior. Af.1398.  $\times 4.0$ ,  $\times 2.5$ .  
FIG. 16. Latex cast of dorsal exterior. Af.1399.  $\times 4.0$ .

*Orthambonites* (?) sp. (2)

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

- FIG. 15. Latex cast of ventral interior. BB.30510.  $\times 3.3$ .  
FIGS. 18, 19. Internal mould and latex cast of pedicle valve. BB.30511a.  $\times 2.9$ .  
FIG. 20. Latex cast of ventral exterior. BB.30511b.  $\times 2.9$ .

*Lenorthis proava* (Salter)

Carmel Formation, sandstones 50 yds. north-east of Prys-owain-bach, Carmel.

- FIG. 21. Internal mould of brachial valve. BB.30512.  $\times 2.3$ .

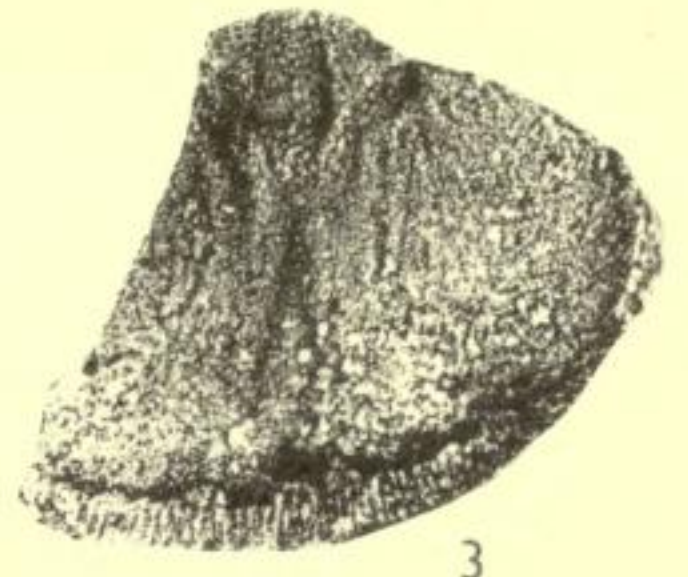




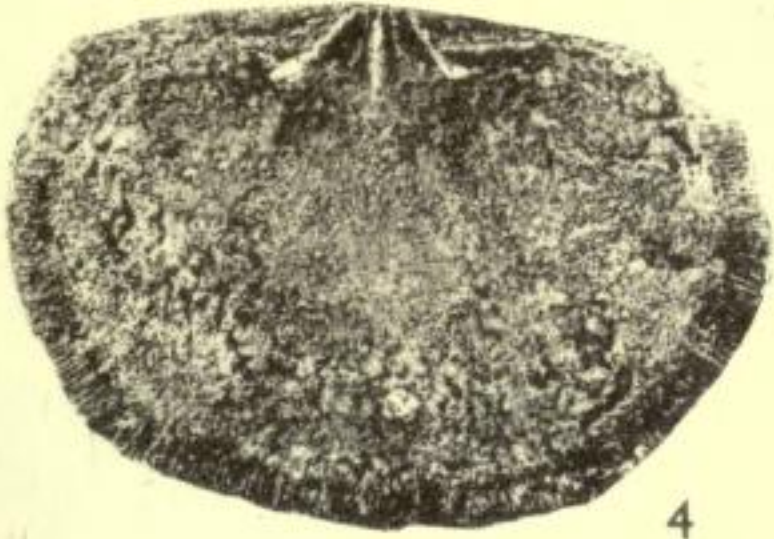
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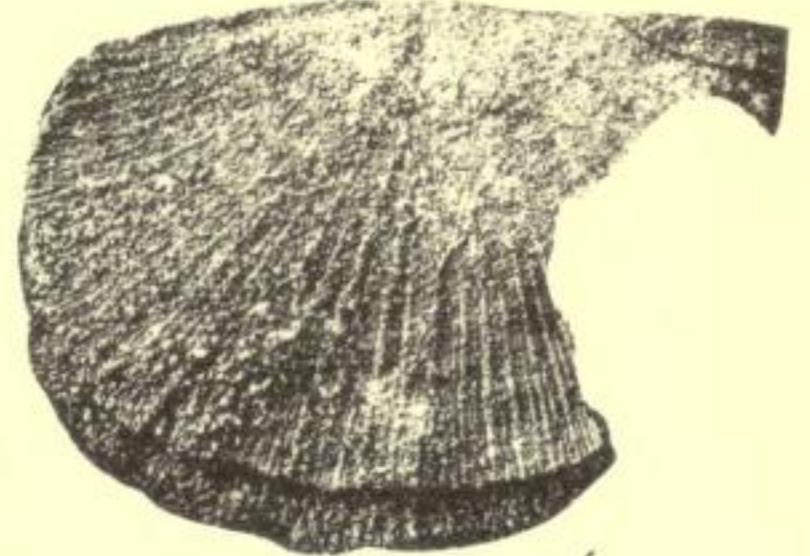
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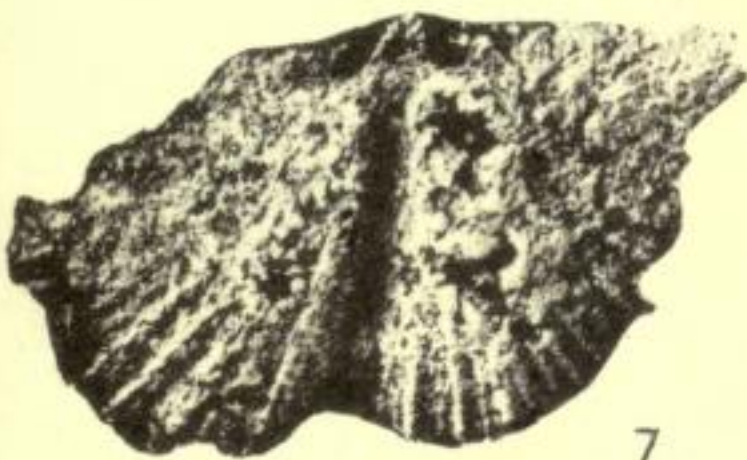
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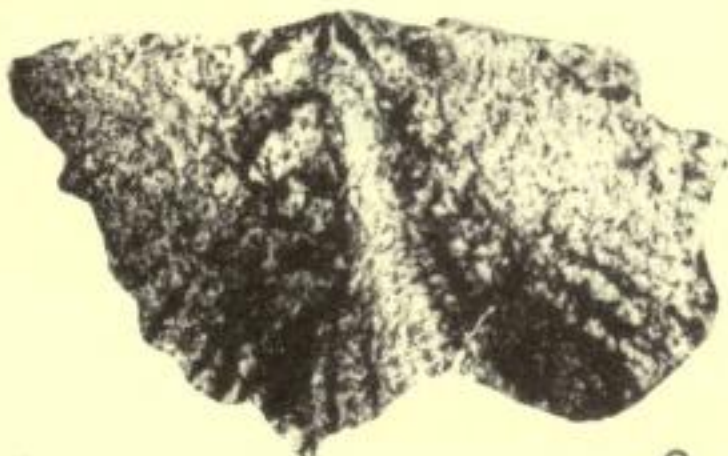
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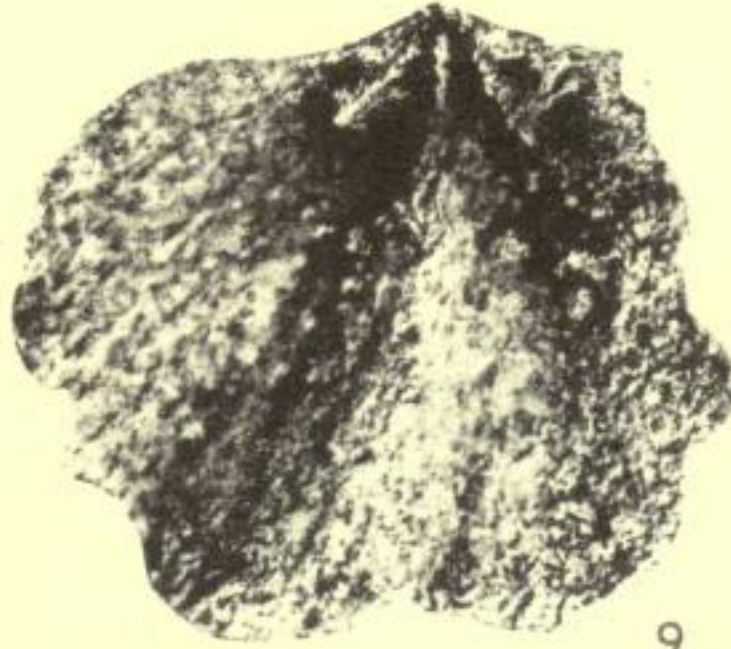
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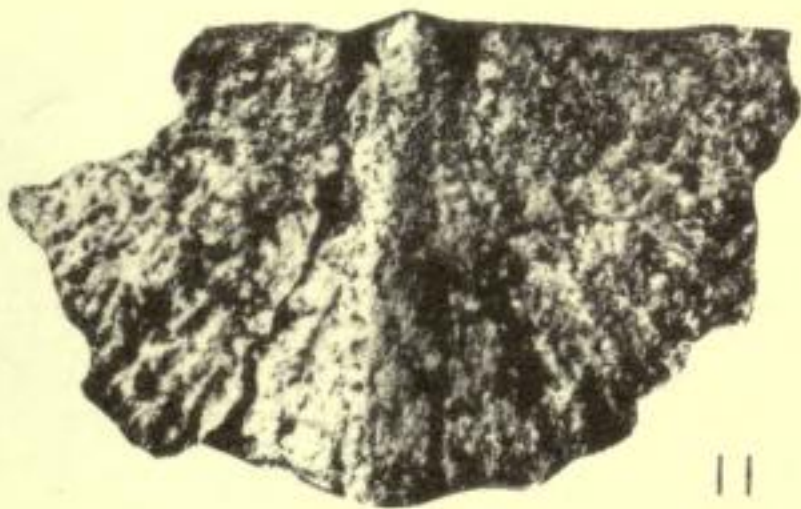
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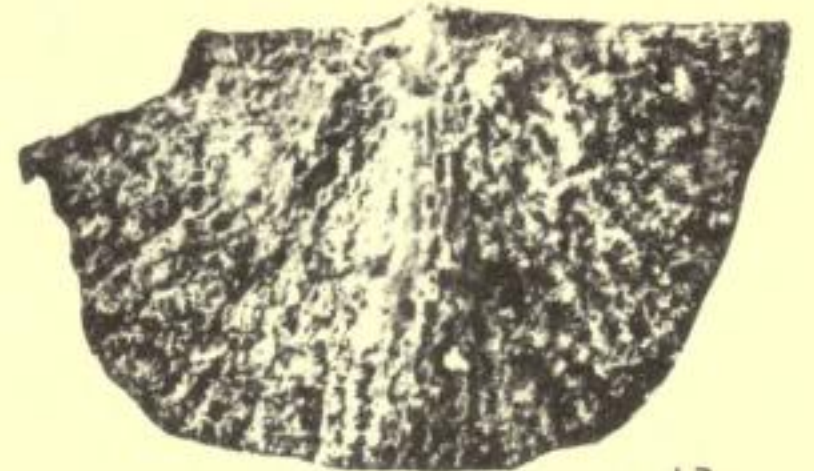
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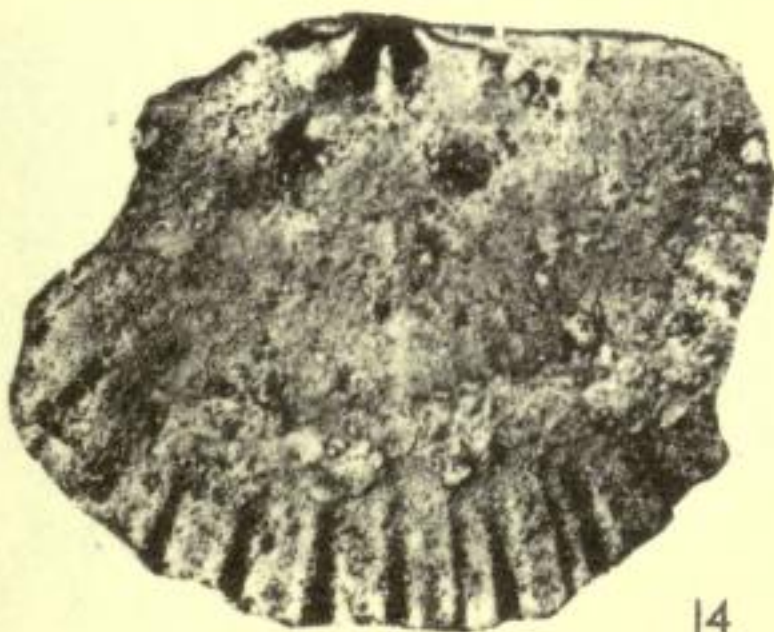
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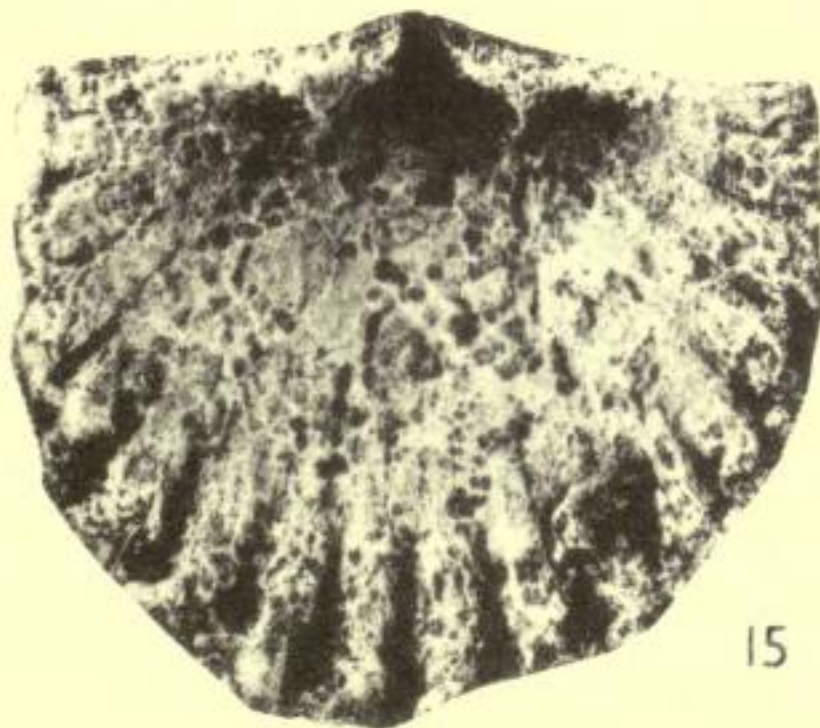
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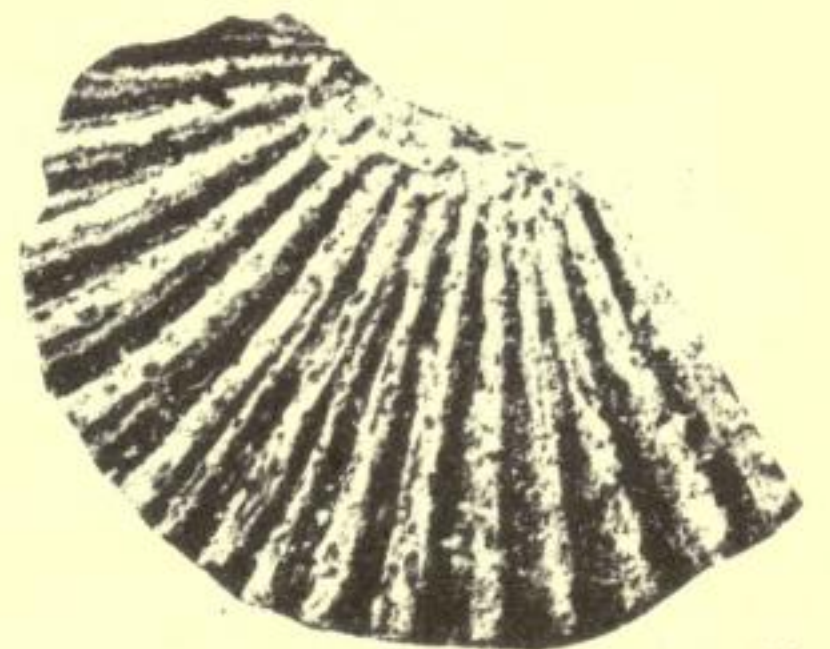
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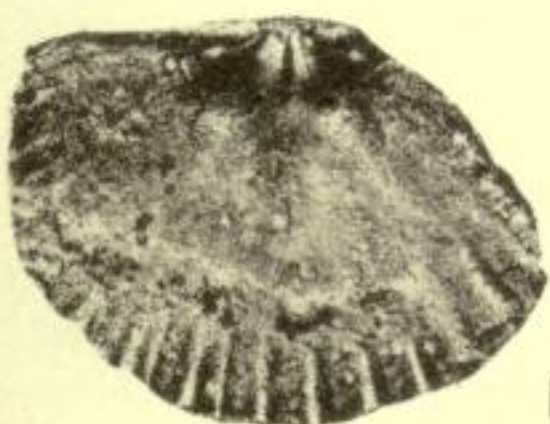
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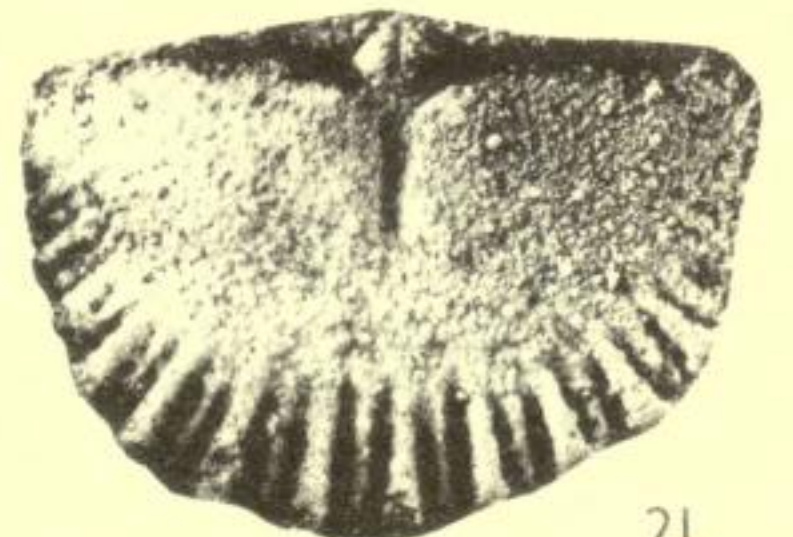
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PLATE 2

*Lenorthis proava* (Salter)

Carmel Formation, sandstones 50 yds. north-east of Prys-owain-bach, Carmel.

- FIG. 1. Latex cast of dorsal interior. BB.30512.  $\times 2.1$ .  
FIG. 2. Latex cast of dorsal interior. BB.30515a.  $\times 2.2$ .  
FIG. 4. Latex cast of dorsal exterior. BB.30515b.  $\times 2.1$ .  
FIG. 5. Latex cast of ventral exterior. BB.30513b.  $\times 2.0$ .  
FIG. 7. Latex cast of ventral interior. BB.30514.  $\times 2.8$ .  
FIG. 8. Latex cast of ventral interior. BB.30513a.  $\times 2.2$ .

Carmel Formation, sandstones 130 yds. north-west of Ty-hen, Treiorwerth.

- FIGS. 3, 6. Internal mould and latex cast of pedicle valve. Af.1337.  $\times 2.4$ .

*Cyrtonotella* sp. (1)

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

- FIGS. 9, 13. Internal mould and latex cast of brachial valve. BB.30521a.  $\times 5.0$ .  
FIG. 10. Latex cast of dorsal exterior. BB.30521b.  $\times 5.0$ .

*Lenorthis* sp.

Bod Deiniol Formation, grits in temporary excavation 50 yds. north of Ty-bach cottage,  
Bod Deiniol.

- FIG. 11. Latex cast of dorsal interior. BB.30602.  $\times 2.1$ .  
FIG. 12. Latex cast of ventral interior. BB.30601a.  $\times 2.7$ .

*Cyrtonotella* sp. (2)

Garn Formation, limestone blocks in breccia beds, Porth-Padrig, Mynachdy.

- FIG. 14. Exterior of brachial valve. BB.30523.  $\times 2.4$ .  
FIG. 15. Latex cast of dorsal exterior. BB.30524.  $\times 2.3$ .  
FIG. 16. Exterior of pedicle valve. BB.30522.  $\times 3.2$ .

*Pleurorthis costatus* sp. nov.

Treiorwerth Formation, sandstones 300 yds. south-east of Ffynnon-y-mab, Trefor.

- FIGS. 17, 18. Holotype, internal mould and latex cast of brachial valve. BB.30516.  $\times 2.2$ .  
FIG. 19. Latex cast of dorsal exterior. BB.30555b.  $\times 3.3$ .



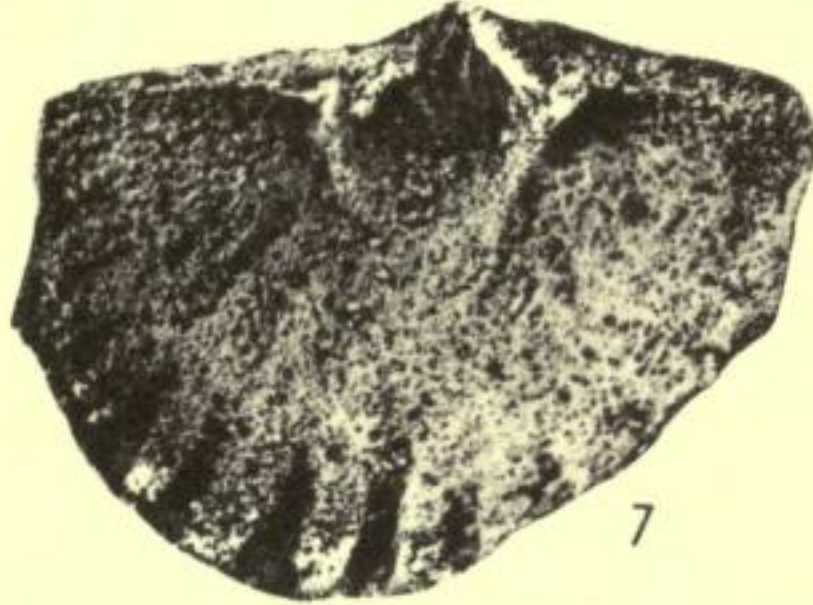
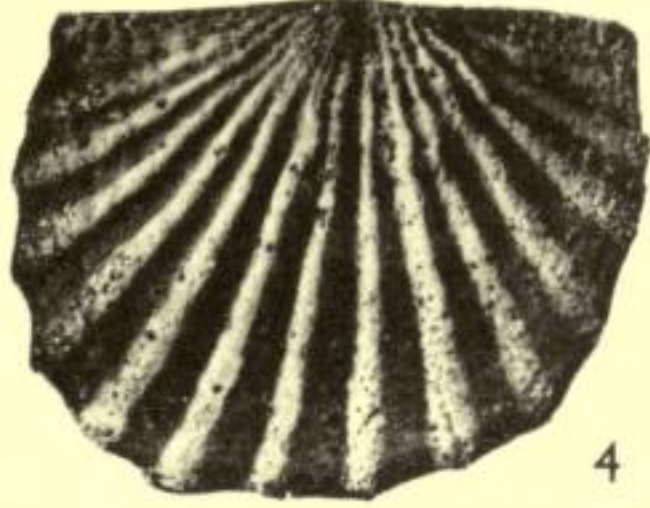
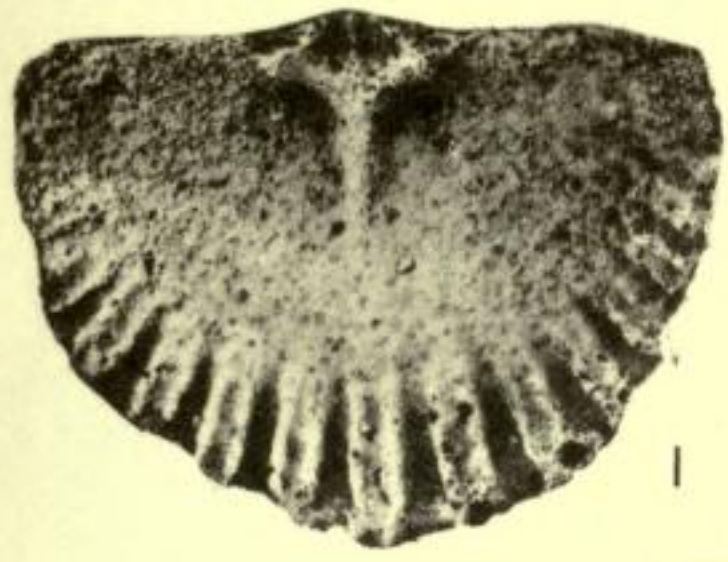




PLATE 3

*Pleurorthis costatus* sp. nov.

Treiorwerth Formation, sandstones 300 yds. south-east of Ffynnon-y-mab, Trefor.

- FIGS. 1, 2. Internal mould and latex cast of pedicle valve. BB.30518.  $\times 2.2$ .  
FIGS. 3, 4. Internal mould and latex cast of pedicle valve. BB.30517a.  $\times 2.3$ .  
FIG. 6. Latex cast of ventral exterior. BB.30517b.  $\times 2.3$ .

*Nicolella humilis* Williams

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

- FIG. 5. Latex cast of dorsal interior. BB.30519a.  $\times 3.1$ .  
FIG. 7. Latex cast of dorsal exterior. BB.30519b.  $\times 3.1$ .  
FIG. 8. Latex cast of dorsal exterior. BB.30520b.  $\times 3.3$ .  
FIG. 9. Internal mould of brachial valve. BB.30520a.  $\times 3.1$ .

*Panderina lamellosa* sp. nov.

Treiorwerth Formation, sandstones 300 yds. south-east of Ffynnon-y-mab, Trefor.

- FIG. 10. Latex cast of dorsal interior. BB.30528a.  $\times 4.2$ .  
FIGS. 11, 12. Holotype, internal mould and latex cast of brachial valve. BB.30525a.  $\times 4.2$ .  
FIG. 13. Latex cast of dorsal exterior. BB.30528b.  $\times 3.0$ .  
FIG. 14. Holotype, latex cast of dorsal exterior. BB.30525b.  $\times 4.0$ .  
FIGS. 15, 16. Latex cast and internal mould of pedicle valve. BB.30526a.  $\times 5.5$ .  
FIG. 17. Latex cast of ventral exterior. BB.30527b.  $\times 3.2$ .  
FIG. 18. Latex cast of ventral interior. BB.30527a.  $\times 4.3$ .

*Ptychopleurella* sp. (1)

Nantannog Formation, fine sandstones and shales 190 yds. south-east of Fferam-uchaf farm, Llanbabo.

- FIG. 19. Latex cast of ventral interior. BB.30537a.  $\times 4.1$ .  
FIG. 20. External mould of pedicle valve. BB.30537b.  $\times 4.6$ .  
FIGS. 21, 22. Internal mould and latex cast of brachial valve. BB.30538a.  $\times 4.5$ .  
FIG. 23. Latex cast of dorsal exterior. BB.30538b.  $\times 4.5$ .



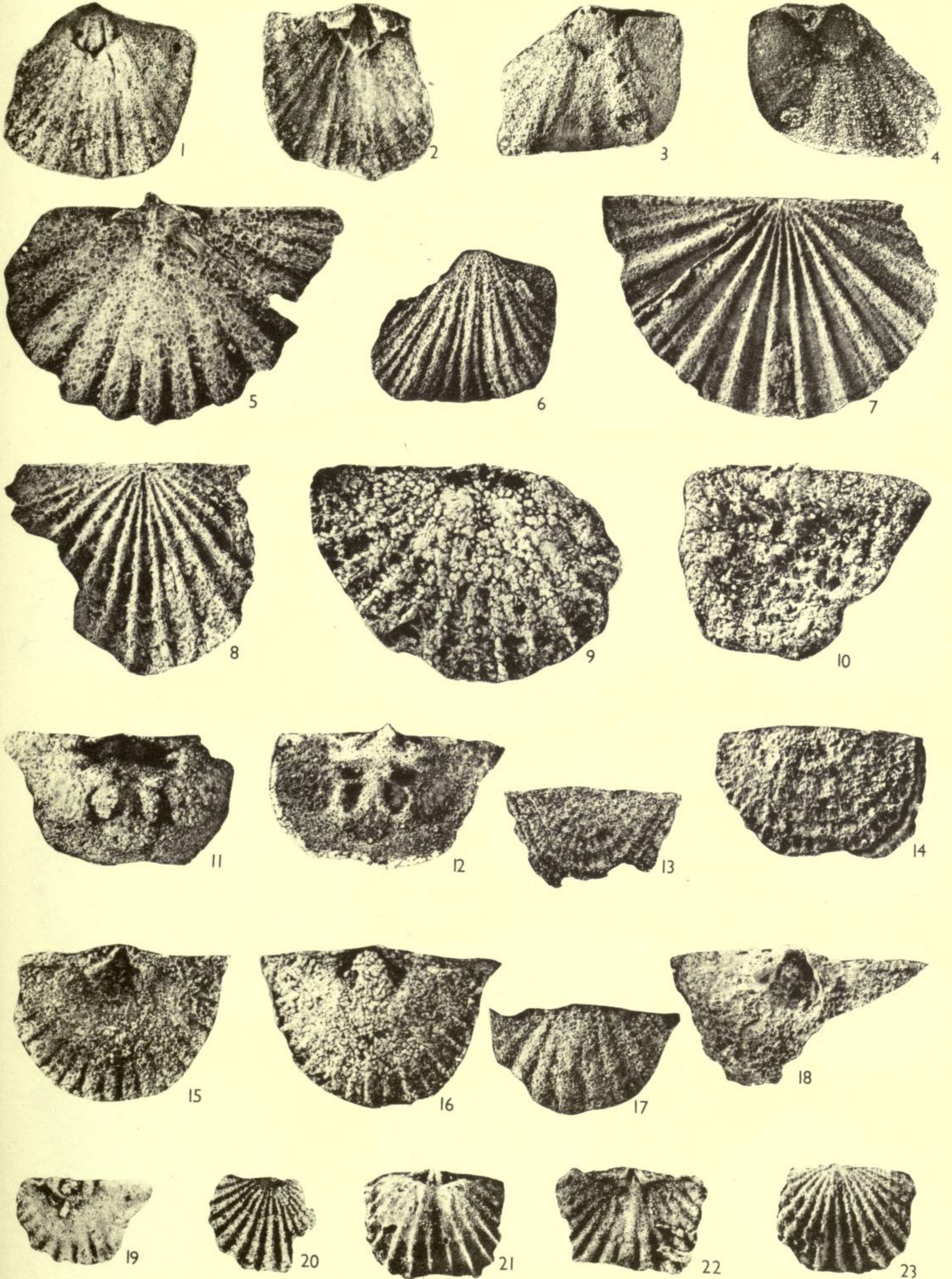




PLATE 4

*Ptychopleurella* sp. (2)

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

- FIG. 1. Internal mould of brachial valve. BB.30539a.  $\times 3.5$ .  
FIGS. 2, 3. Internal mould and latex cast of pedicle valve. BB.30540a.  $\times 4.1$ .  
FIG. 5. Fragment of external mould of pedicle valve. BB.30540b.  $\times 4.0$ .

*Dolerorthis* cf. *tenuicostata* Williams

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

- FIG. 4. Latex cast of ventral exterior. BB.30541b.  $\times 3.1$ .  
FIGS. 6, 7. Internal mould latex cast of pedicle valve. BB.30541a.  $\times 2.6$ ,  $\times 3.1$ .

*Plaesiomys* cf. *robusta* (Bancroft)

Crewyn Formation, grits 420 yds. west-south-west of Ysgubor-gader, Mynachdy.

- FIG. 8. Latex cast of dorsal exterior. BB.30543b.  $\times 2.0$ .  
FIG. 9. Latex cast of dorsal interior. BB.30543a.  $\times 2.2$ .  
FIG. 10. Internal mould of pedicle valve. BB.30544a.  $\times 1.7$ .  
FIG. 11. External mould of pedicle valve. BB.30545b.  $\times 1.7$ .  
FIG. 12. Internal mould of pedicle valve. BB.30545a.  $\times 1.7$ .

*Plaesiomys* (*Dinorthis*) sp.

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

- FIGS. 13, 15. Internal mould and latex cast of pedicle valve. BB.30542a.  $\times 2.6$ .  
FIG. 14. Latex cast of ventral exterior. BB.30542b.  $\times 3.2$ .

*Plectorthis* (?) sp.

Nantannog Formation, gritty shales 250 yds. west-south-west of Fferam-uchaf, Llanbabo.

- FIG. 16. Internal mould of pedicle valve. Af.1377.  $\times 4.0$ .  
FIG. 19. Internal mould of pedicle valve. Af.1462.  $\times 2.9$ .

*Platystrophia precedens major* Williams

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

- FIG. 17. Latex cast of ventral interior. BB.30546a.  $\times 2.2$ .  
FIG. 18. Latex cast of ventral exterior. BB.30546b.  $\times 2.0$ .





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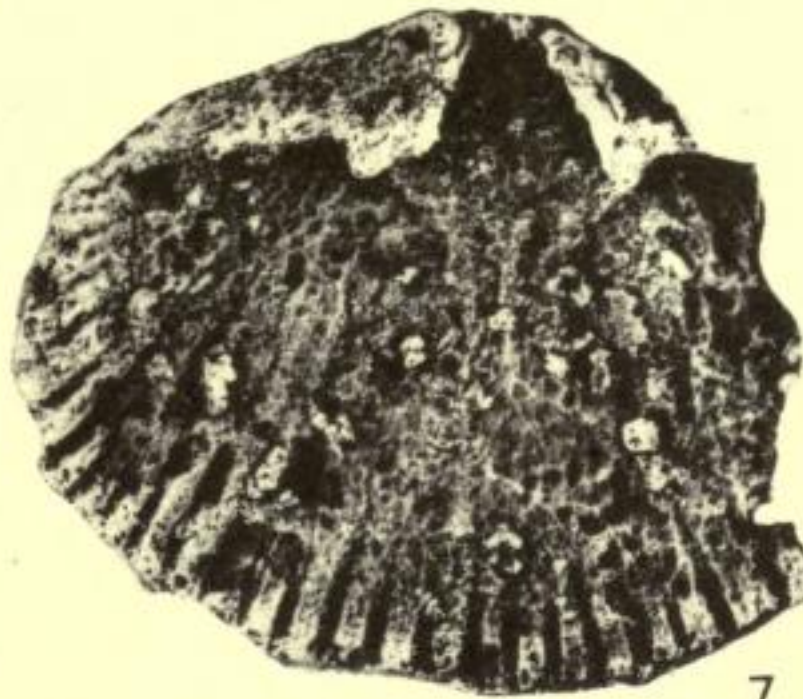
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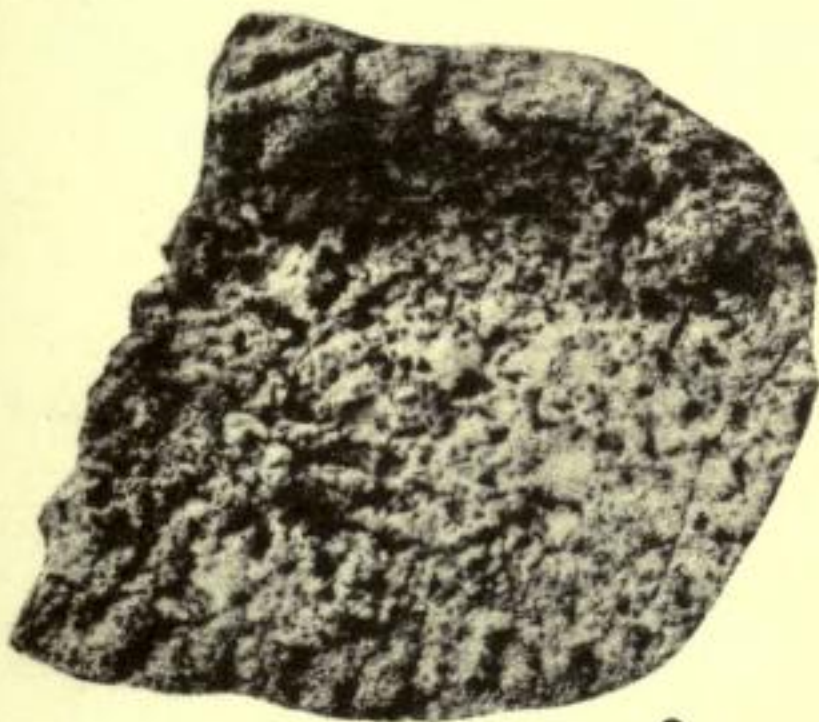
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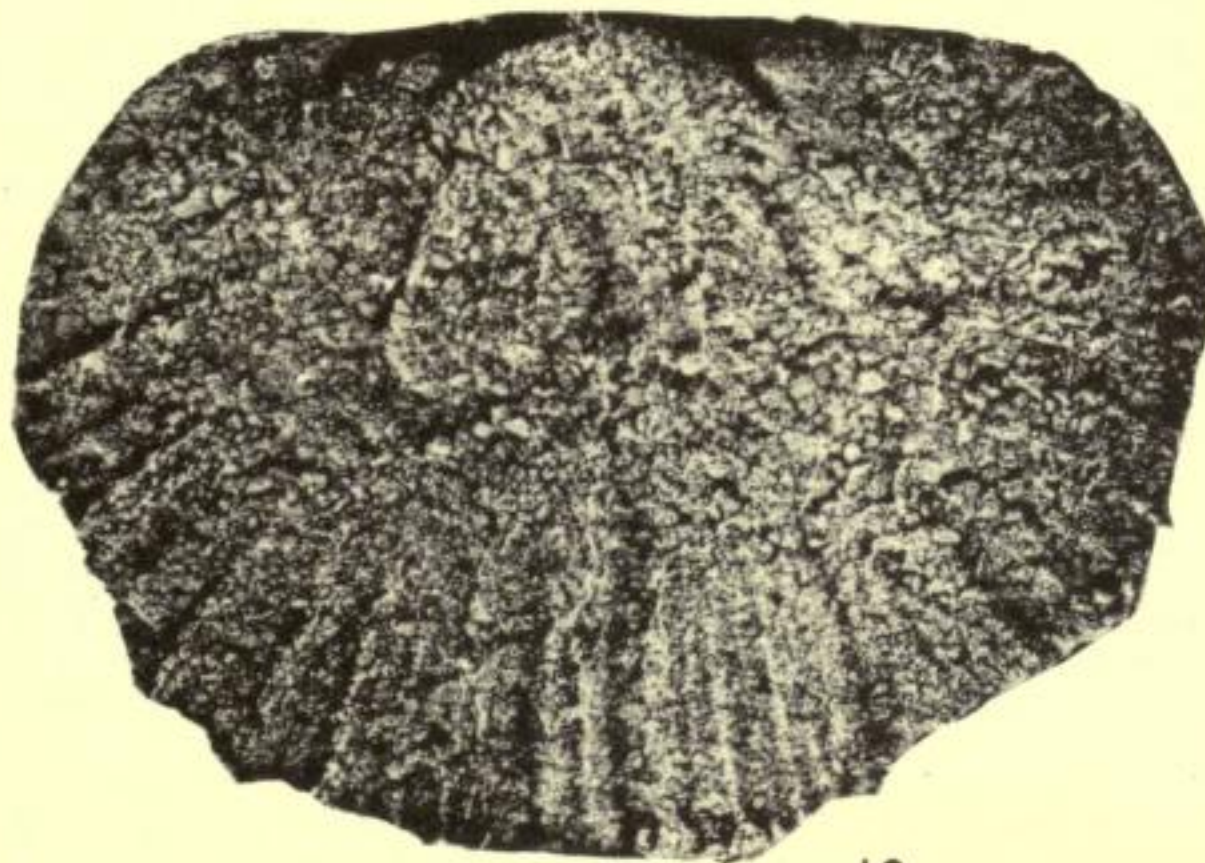
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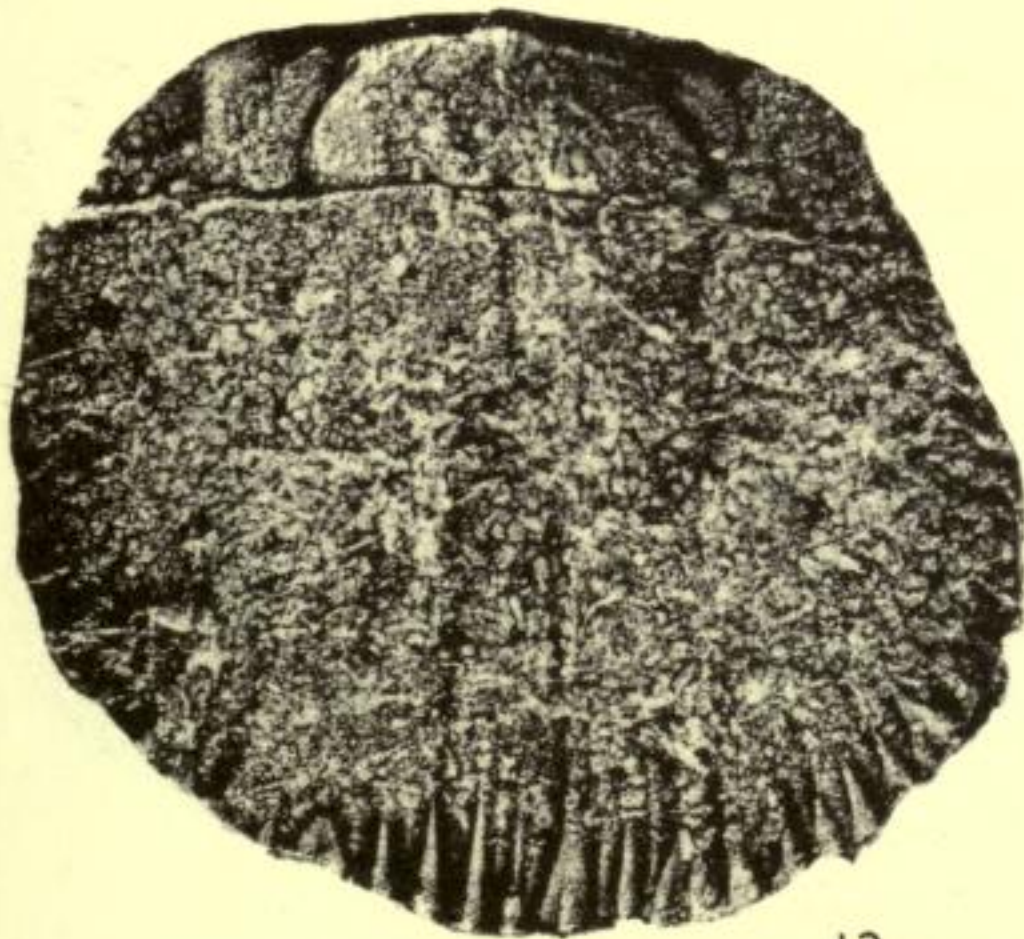
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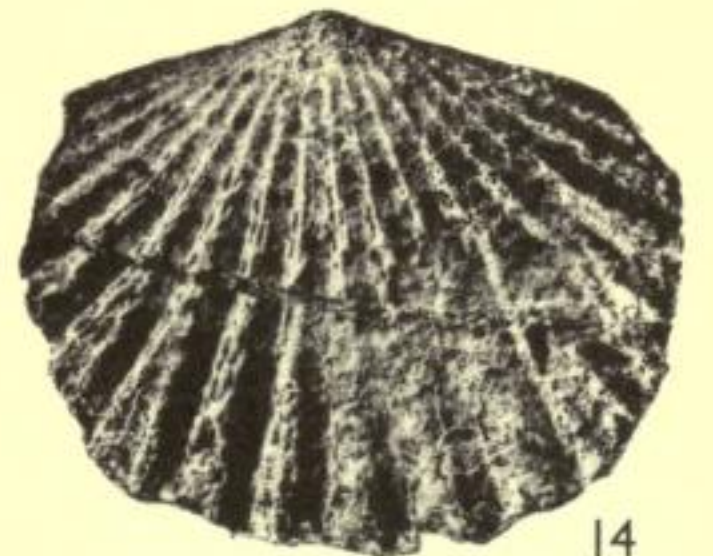
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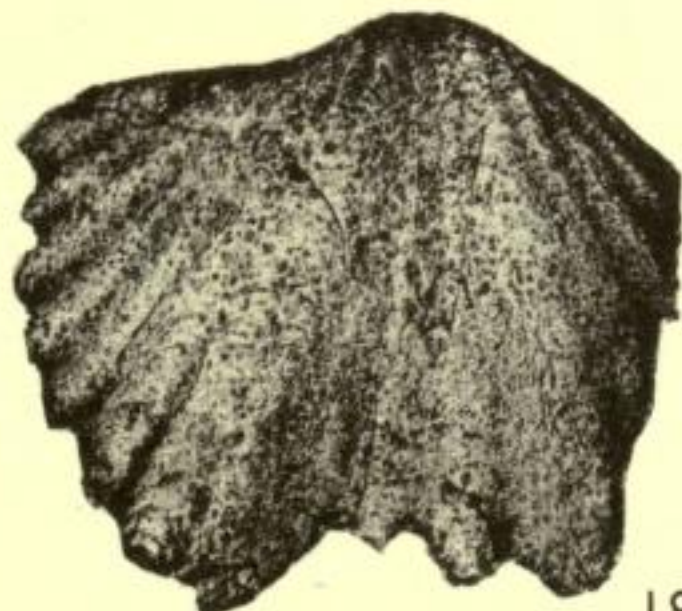
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PLATE 5

*Skenidioides* sp. (1)

Treiorwerth Formation, sandstones 300 yds. south-east of Ffynnon-y-mab, Trefor.

- FIG. 1. Internal mould of pedicle valve. BB.30547.  $\times 7.7$ .  
FIG. 2. Internal mould of brachial valve. BB.30548.  $\times 6.1$ .

*Skenidioides* sp. (2)

Nantannog Formation, fine sandstones and shales 190 yds. south-east of Fferam-uchaf, Llanbabo.

- FIG. 3. Internal mould of brachial valve. BB.30549a.  $\times 6.5$ .  
FIG. 4. Internal mould of pedicle valve. BB.30550a.  $\times 7.6$ .  
FIG. 5. External mould of brachial valve. BB.30549b.  $\times 6.5$ .

*Paurorthis*(?) sp.

Bod Deiniol Formation, grits in temporary excavation 50 yds. north of Ty-bach cottage,  
Bod Deiniol.

- FIGS. 6, 7. Internal mould and latex cast of pedicle valve. BB.30603a.  $\times 2.5$ .  
FIG. 8. Latex cast of ventral interior. BB.30604a.  $\times 2.5$ .  
FIG. 9. Latex cast of ventral exterior. BB.30604b.  $\times 2.5$ .

*Dalmanella*(?) sp.

Crewyn Formation, grits 420 yds. west-south-west of Ysgubor-gader, Mynachdy.

- FIG. 10. Latex cast of brachial exterior. BB.30568.  $\times 2.5$ .  
FIG. 11. Latex cast of ventral exterior. BB.30569.  $\times 2.7$ .

*Onniella*(?) sp.

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

- FIG. 12. Internal mould of pedicle valve. BB.30570a.  $\times 3.7$ .  
FIG. 13. Latex cast of ventral exterior. BB.30570b.  $\times 3.9$ .  
FIG. 14. Internal mould of brachial valve. BB.30571.  $\times 4.9$ .

*Horderleyella*(?) sp.

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

- FIG. 15. Internal mould of pedicle valve. BB.30572.  $\times 2.9$ .

*Harknessella* sp.

Garn Formation, limestone block in breccia bed, 300 yds. east-south-east of the summit  
of Mynydd-y-garn.

- FIG. 16. Exterior of pedicle valve. Af.1492.  $\times 3.0$ .

*Salopia salteri gracilis* Williams

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

- FIGS. 17, 18. Internal mould and latex cast of brachial valve. BB.30573.  $\times 3.9$ ,  $\times 4.1$ .

*Rhynchorthis rotundus* gen. et sp. nov.

Treiorwerth Formation, sandstones 300 yds. south-east of Ffynnon-y-mab, Trefor.

- FIGS. 19, 20. Holotype, internal mould and latex cast of brachial valve. BB.30551.  
 $\times 2.9$ ,  $\times 3.5$ .  
FIGS. 21, 22. Internal mould and latex cast of brachial valve. BB.30552.  $\times 3.4$ ,  $\times 3.7$ .  
FIGS. 23, 25. Internal mould and latex cast of pedicle valve. BB.30556.  $\times 3.4$ ,  $\times 3.1$ .  
FIG. 24. Internal mould of pedicle valve. BB.30554.  $\times 3.2$ .  
FIG. 26. Internal mould of brachial valve. BB.30553.  $\times 3.0$ .



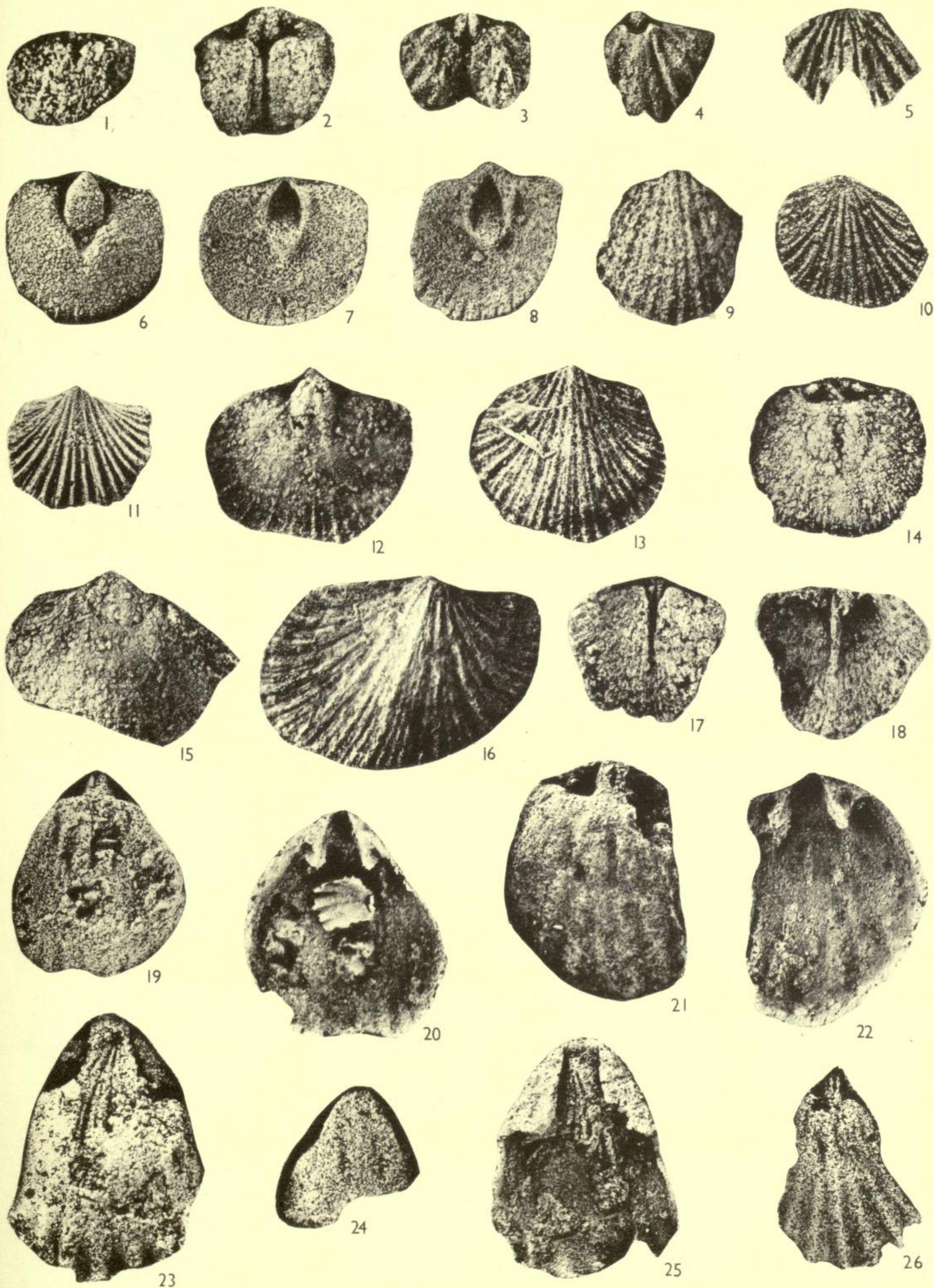




PLATE 6

*Tritoechia* sp.

Treiorwerth Formation, sandstones 300 yds south-east of Ffynnon-y-mab, Trefor.

FIG. 1. Latex cast of ventral interior. BB.30557a.  $\times 2.2$ .

FIG. 2. Latex cast of ventral interior, and exterior of interarea, posterior view. BB.30557a.  $\times 2.2$ .

FIGS. 3, 5. Latex cast of ventral exterior, posterior and ventral views. BB.30557b.  $\times 2.0$ .

*Clitambonites*(?) sp.

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

FIG. 4. Latex cast of dorsal exterior. BB.30558.  $\times 1.4$ .

*Ilmarinia* sp.

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

FIGS. 6, 7. Internal mould of pedicle valve, ventral and posterior views. BB.30559a.  $\times 3.1$ .

*Apomatella*(?) sp.

Bod Deiniol Formation, grits in temporary excavation 50 yds. north of Ty-bach cottage, Bod Deiniol.

FIG. 8. Latex cast of ventral interior. BB.30605a.  $\times 3.0$ .

FIG. 9. Latex cast of ventral exterior, posterior view. BB.30605b.  $\times 3.0$ .

FIG. 10. Latex cast of ventral exterior, posterior view. BB.30606b.  $\times 2.3$ .

FIG. 11. Latex cast of ventral interior. BB.30606a.  $\times 2.4$ .

*Antigonambonites pyramidalis* sp. nov.

Treiorwerth Formation, sandstones 300 yds. south-east of Ffynnon-y-mab, Trefor.

FIG. 12. Holotype, latex cast of dorsal interior. BB.30561a.  $\times 4.1$ .

FIG. 13. Holotype, latex cast of dorsal exterior. BB.30561b.  $\times 4.4$ .

FIGS. 14, 15. Latex cast and internal mould of brachial valve. BB.30563.  $\times 2.8$ ,  $\times 2.2$ .

FIGS. 16, 17. Internal mould and latex cast of pedicle valve. BB.30564.  $\times 3.3$ ,  $\times 3.5$ .

FIG. 18. Internal mould of pedicle valve. BB.30562.  $\times 4.0$ .

*Kullervo* aff. *panderi* (Öpik)

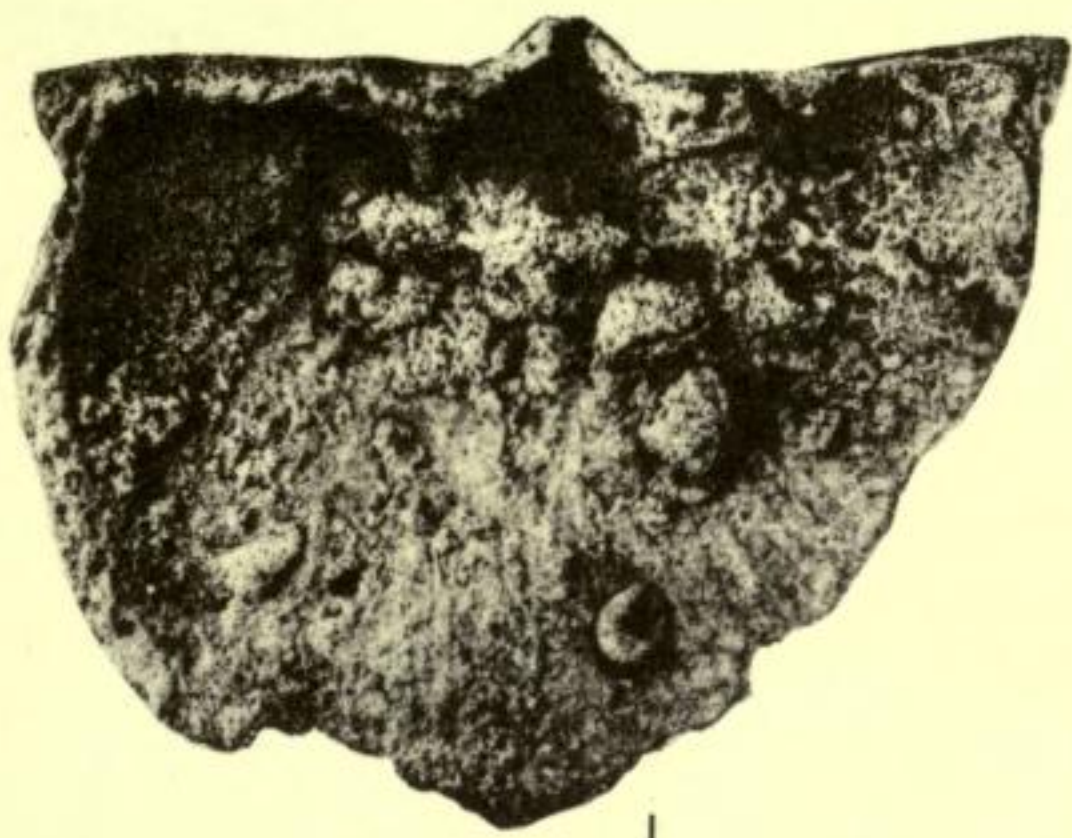
Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

FIGS. 19, 20. Internal mould and latex cast of brachial valve. BB.30567a.  $\times 4.0$ .

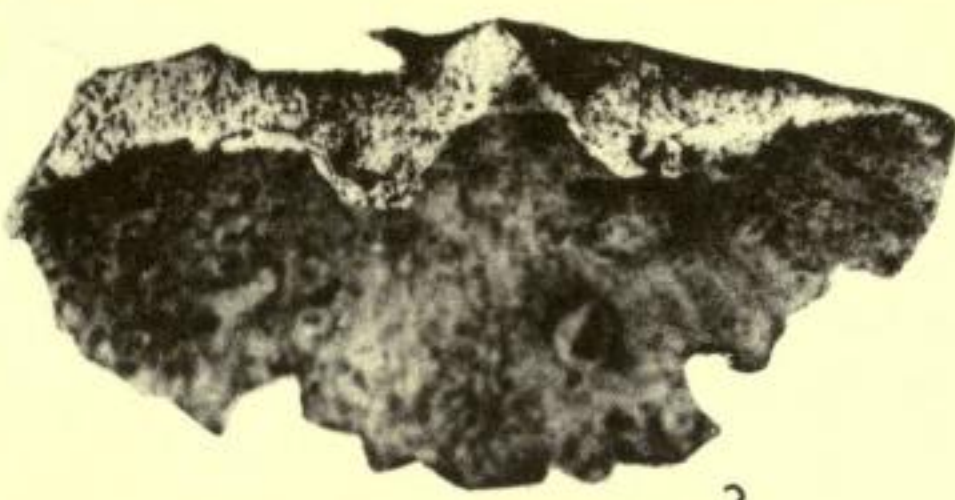
FIG. 21. Latex cast of dorsal exterior. BB.30567b.  $\times 4.0$ .

FIG. 22. Internal mould of pedicle valve. BB.30565.  $\times 2.5$ .

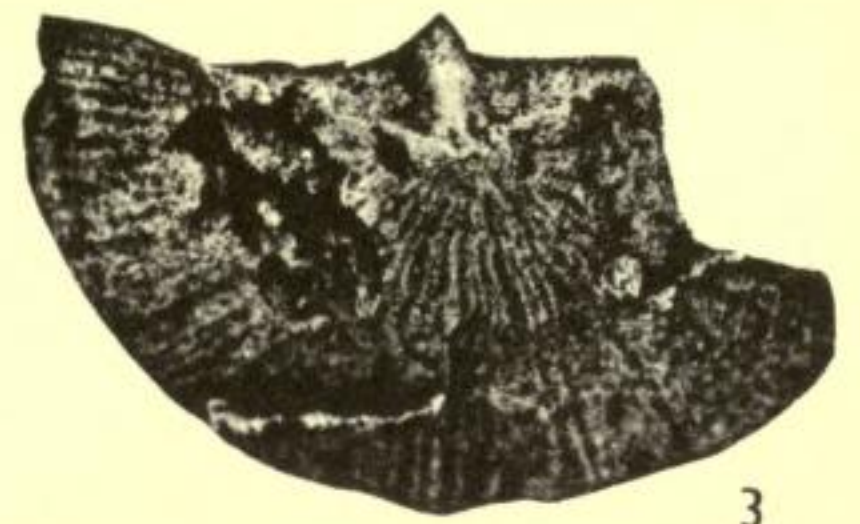




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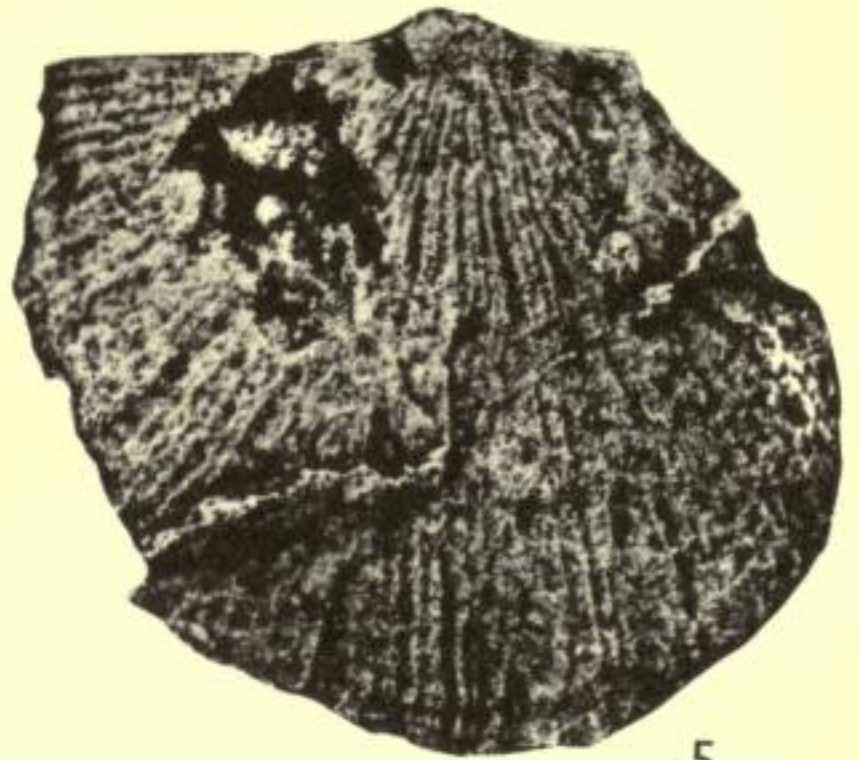
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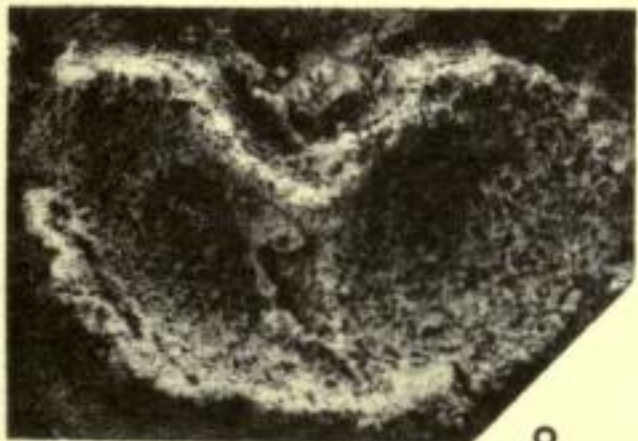
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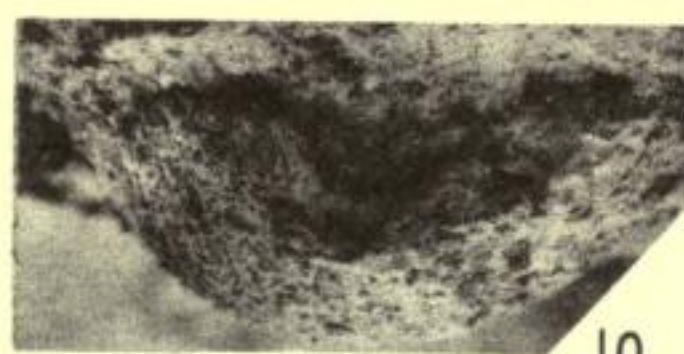
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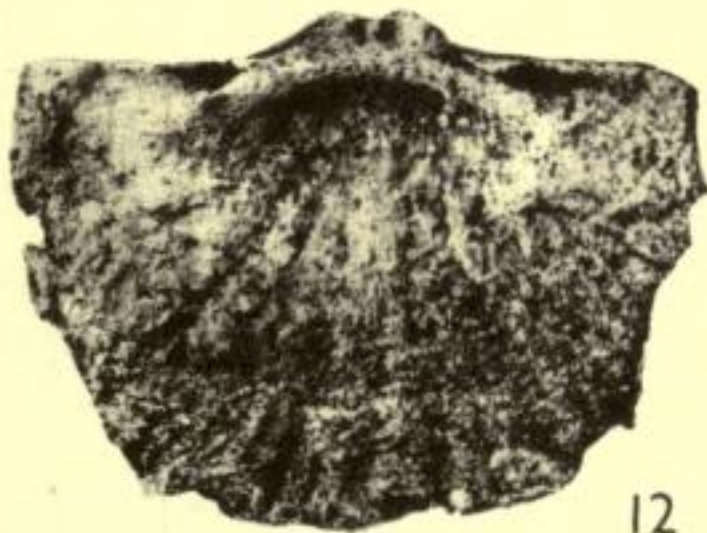
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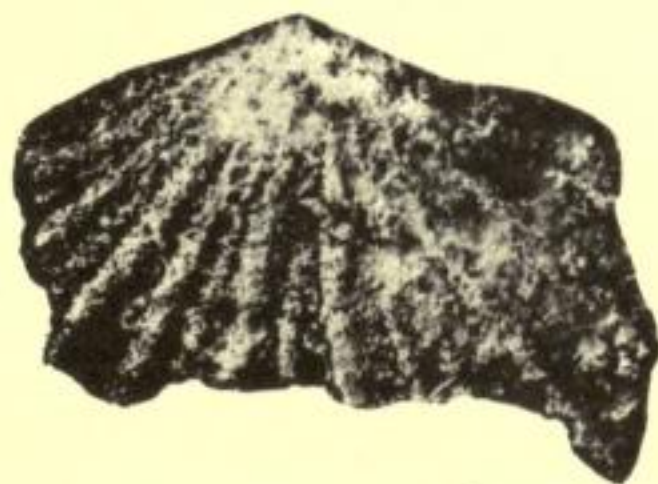
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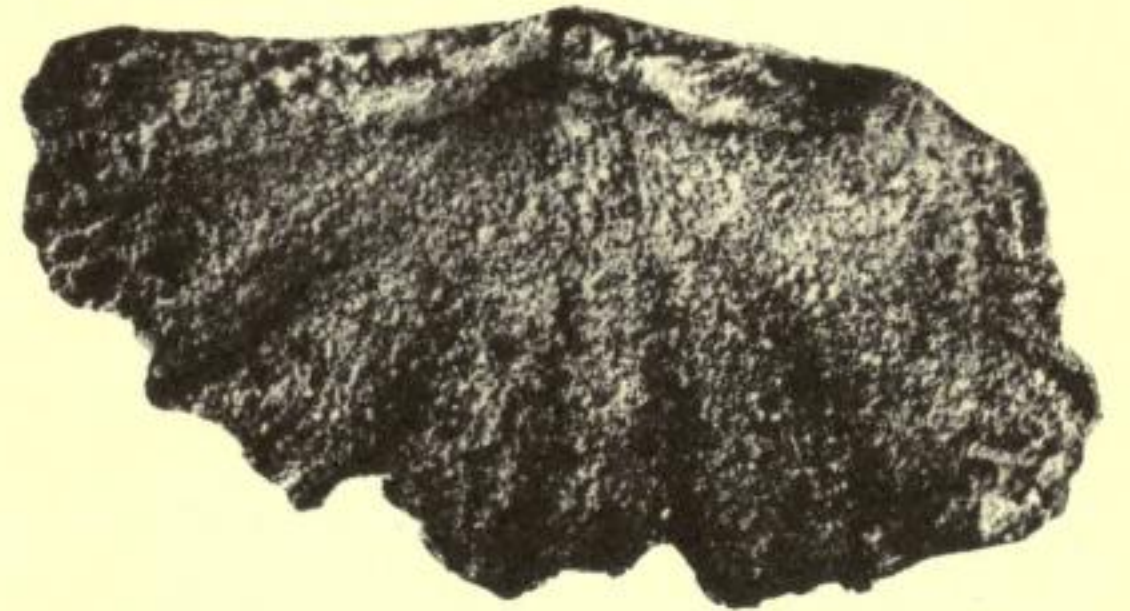
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PLATE 7

*Kullervo* aff. *panderi* (Öpik)

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

FIG. 1. Latex cast of ventral interior. BB.30566.  $\times 5.1$ .

*Estlandia*(?) sp.

Berw-uchaf Grits, 90 yds. north of Bwlch-gwyn farm, Holland Arms.

FIG. 2. Latex cast of ventral interior. Af.238.  $\times 5.2$ .

FIG. 3. Latex cast of ventral exterior. Af.225.  $\times 5.2$ .

FIGS. 4, 9. Internal mould and latex cast of brachial valve. Af.214.  $\times 5.0$ .

FIGS. 6, 7. Internal mould and latex cast of brachial valve. BB.30560a.  $\times 7.7$ .

FIG. 8. Latex cast of dorsal exterior. BB.30560b.  $\times 7.7$ .

Clitambonitid gen. indet.

Bod Deiniol Formation, grits in temporary excavation 50 yds. north of Ty-bach cottage,  
Bod Deiniol.

FIG. 5. Latex cast of dorsal interior. BB.30608a.  $\times 2.0$ .

FIGS. 10, 11. Latex cast of ventral interior, dorsal and anterior views. BB.30607.  $\times 3.0$ .

*Ahtiella concava* sp. nov.

Bod Deiniol Formation, grits in temporary excavation 50 yds. north of Ty-bach cottage,  
Bod Deiniol.

FIG. 13. Latex cast of dorsal interior. BB.30616a.  $\times 2.4$ .

FIG. 12. Latex cast of dorsal interior, cardinalia. BB.30616a.  $\times 3.0$ .

FIG. 14. Holotype, latex cast of ventral interior. BB.30615a.  $\times 1.9$ .

FIGS. 15, 18. Holotype, latex cast of ventral exterior, ventral and posterior views. BB.  
30615b.  $\times 1.9$ .

FIGS. 16, 19. Latex cast of dorsal interior, ventral and oblique posterior views. BB.  
30618a.  $\times 2.4$ .

FIG. 22. Latex cast of dorsal exterior. BB.30616b.  $\times 2.3$ .

FIG. 17. Latex cast of dorsal interior. BB.30617a.  $\times 2.2$ .

FIG. 20. Latex cast of ventral interior. BB.30619a.  $\times 2.3$ .

FIG. 21. Latex cast of ventral exterior. BB.30619b.  $\times 2.2$ .



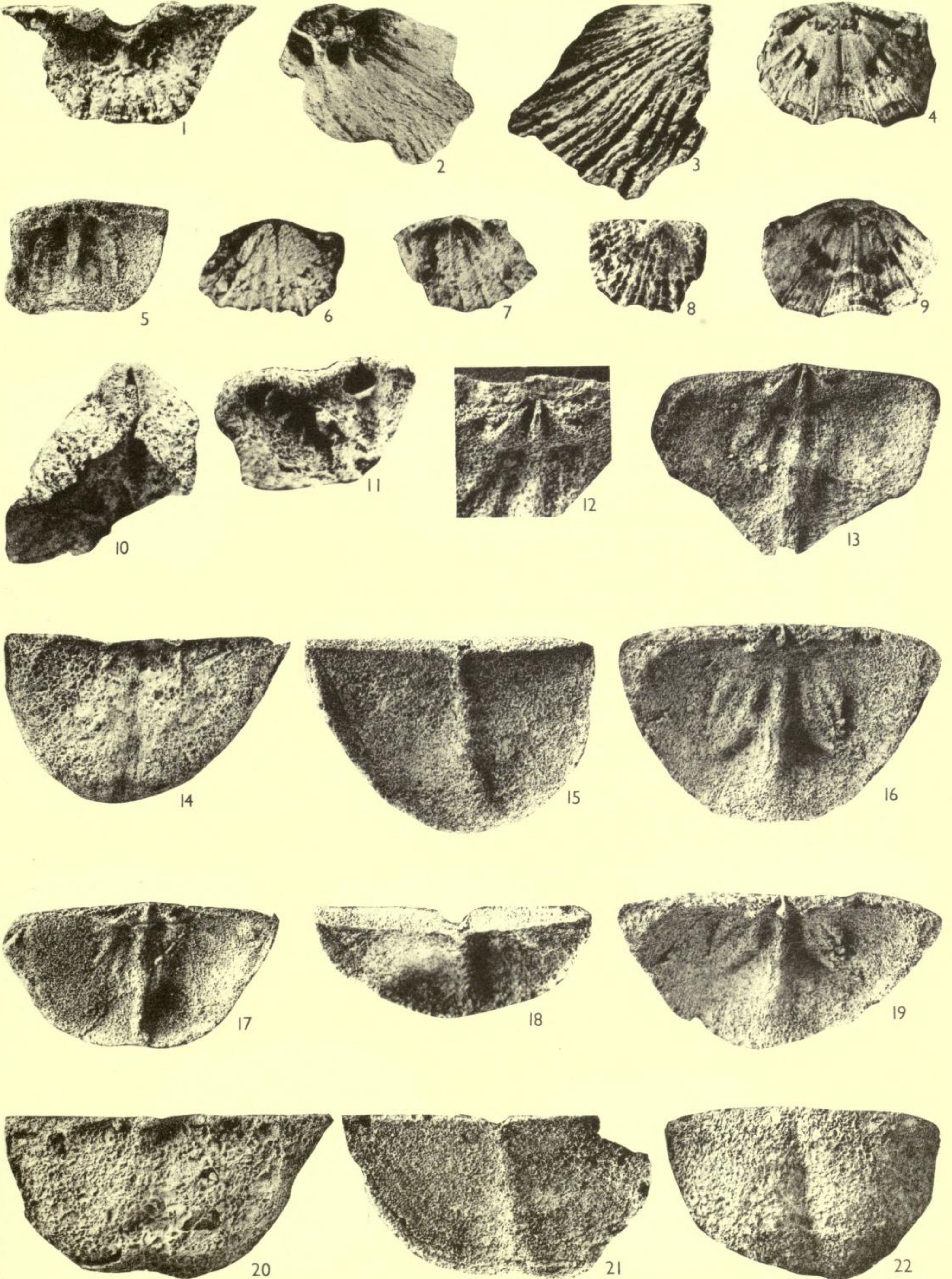




PLATE 8

*Ahtiella quadrata* sp. nov.

Torllwyn Formation, sandstones 50 ft. above the base of the succession, on the north side of the faulted syncline, 45 yds. north of Ogof Gynfor, Llanbadrig.

- FIG. 1. Latex cast of dorsal interior. BB.30613a.  $\times 2.2$ .  
FIG. 4. Latex cast of dorsal exterior. BB.30613b.  $\times 2.0$ .  
FIG. 2. Latex cast of ventral interior. BB.30611a.  $\times 2.0$ .  
FIG. 3. Latex cast of ventral exterior. BB.30611b.  $\times 2.0$ .  
FIG. 5. Latex cast of dorsal interior. BB.30612a.  $\times 2.2$ .  
FIG. 6. Latex cast of dorsal exterior. BB.30612b.  $\times 1.9$ .  
FIG. 7. Latex cast of dorsal interior. BB.30614a.  $\times 2.3$ .  
FIG. 8. Holotype, latex cast of ventral interior. BB.30609.  $\times 2.0$ .  
FIG. 9. Latex cast of ventral interior. BB.30610.  $\times 2.0$ .

*Reinversella monensis* gen. et sp. nov.

Treiorwerth Formation, sandstones 300 yds. south-east of Ffynnon-y-mab, Trefor.

- FIGS. 10, 11. Holotype, internal mould and latex cast of brachial valve. BB.30574a.  $\times 1.6$ .  
FIG. 12. Holotype latex cast of dorsal exterior. BB.30574b.  $\times 1.6$ .  
FIGS. 13, 14. Internal mould and latex cast of pedicle valve. BB.30575a.  $\times 1.9$ ,  $\times 1.7$ .  
FIG. 15. Latex cast of ventral exterior. BB.30575b.  $\times 2.2$ .  
FIG. 16. Internal mould of brachial valve. BB.30576a.  $\times 2.1$ .  
FIG. 17. Latex cast of dorsal exterior. BB.30576b.  $\times 2.2$ .



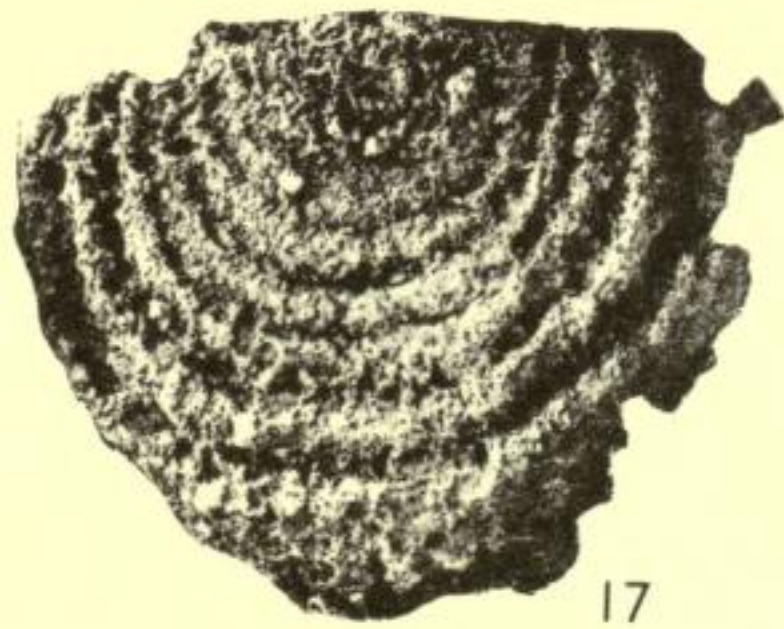
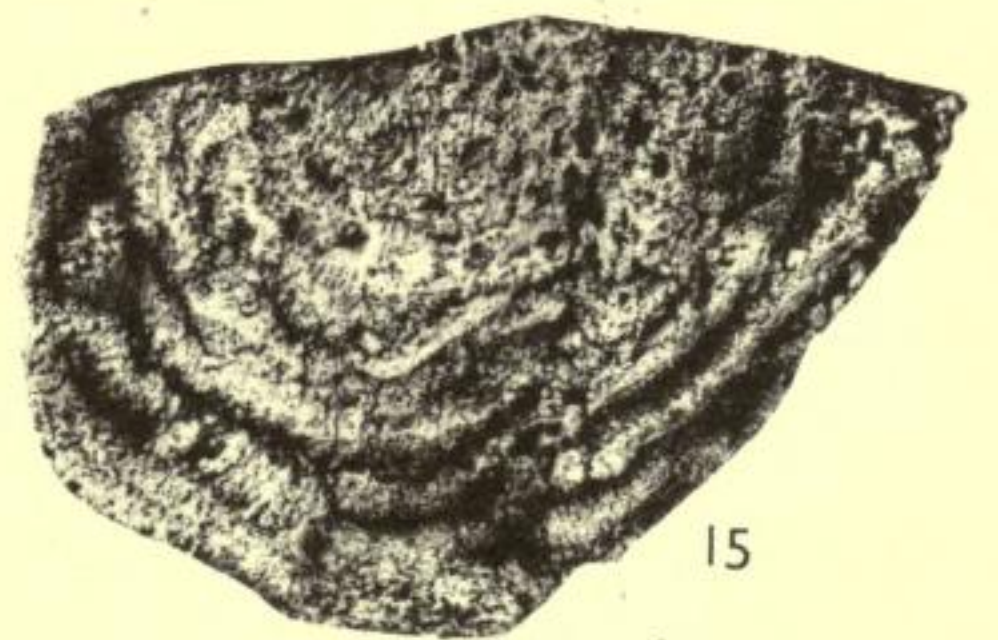
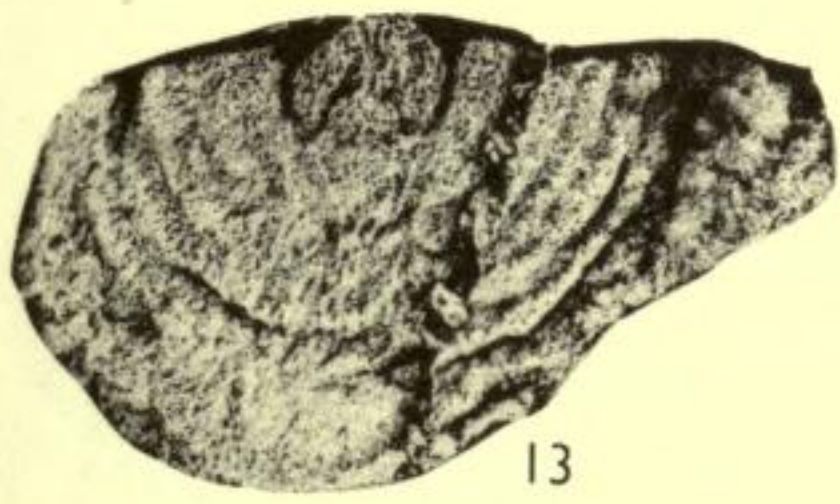
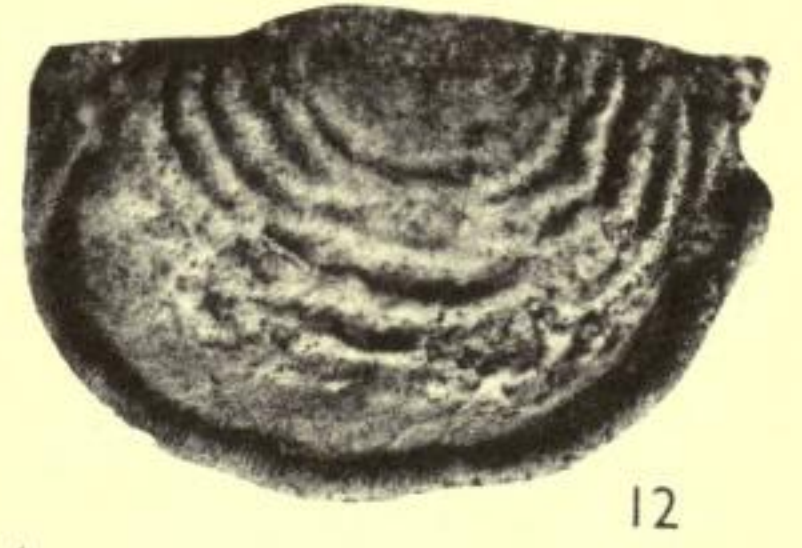
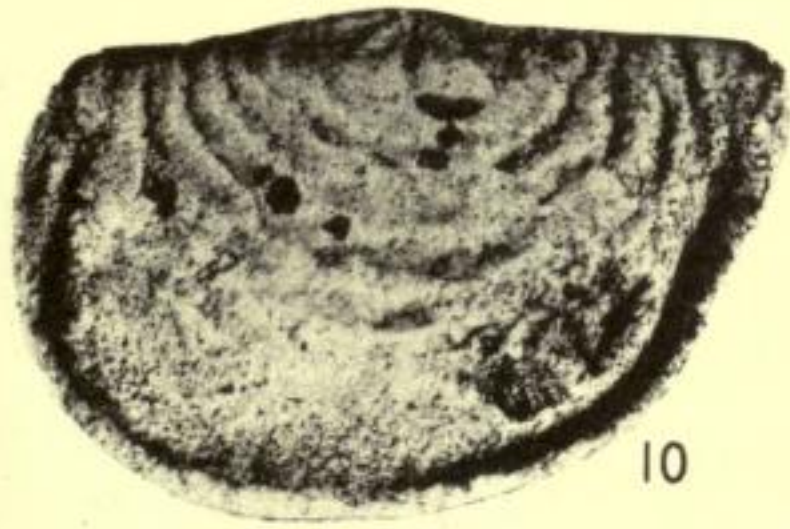
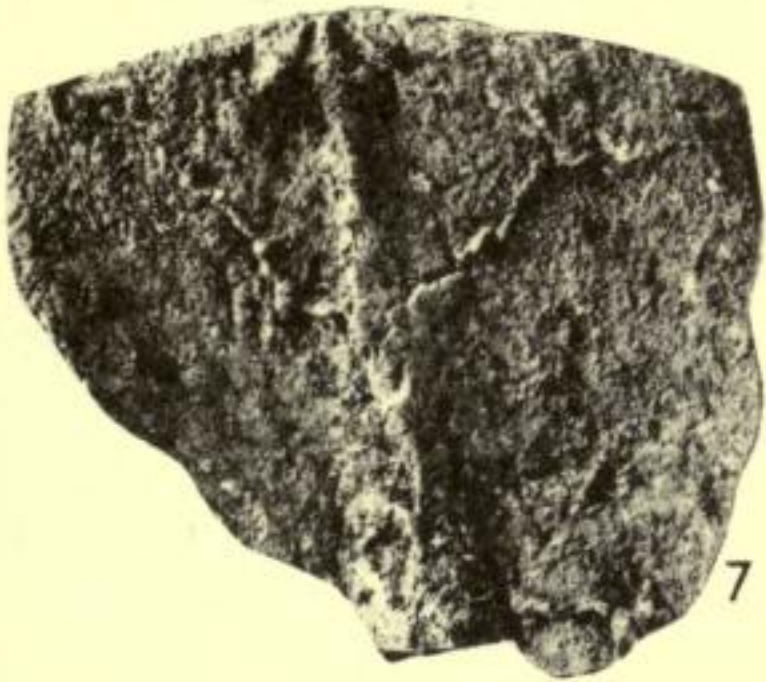
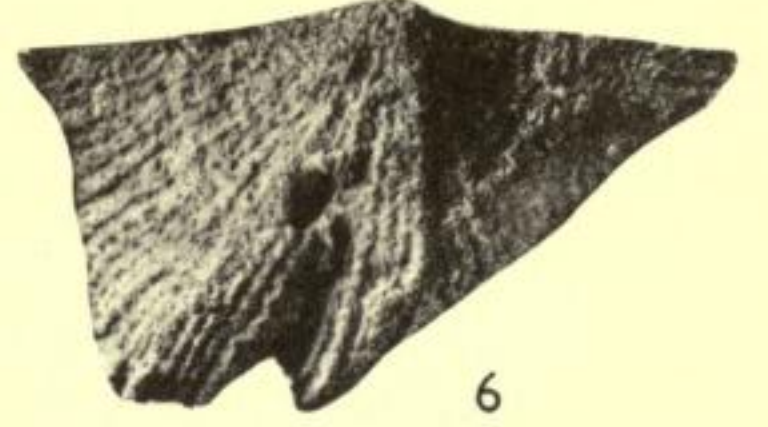
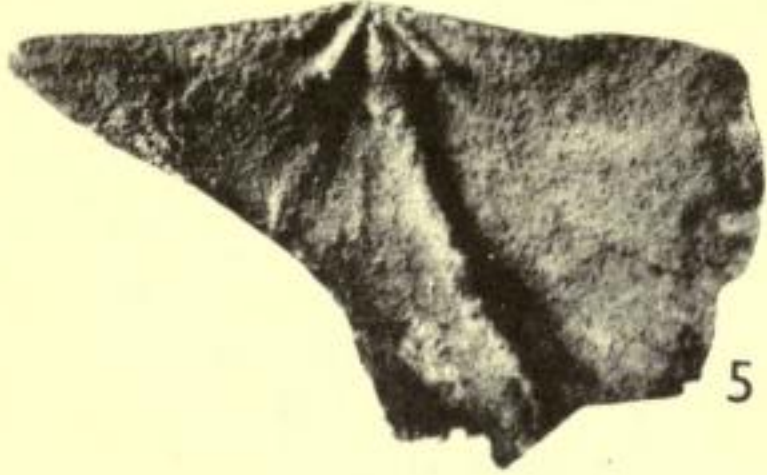
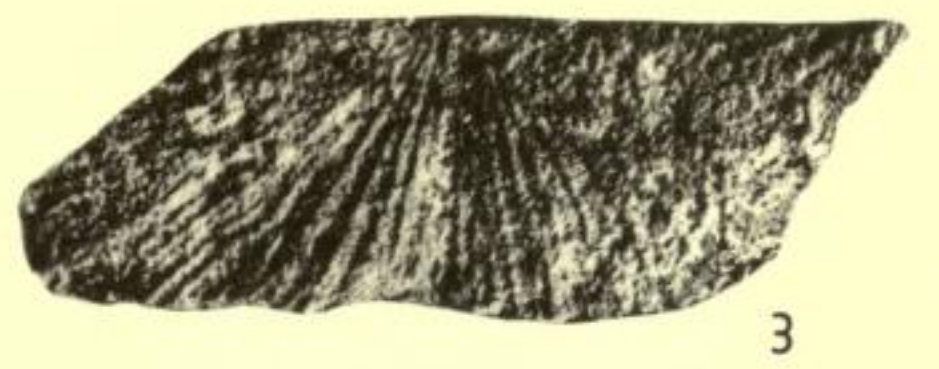




PLATE 9

*Palaeostrophomena*(?) sp.

Garn Formation, limestone blocks in breccia beds at Porth Padrig, Mynachdy.

FIG. 1. Exterior of pedicle(?) valve. BB.30581a.  $\times 2.2$ .

*Sericoidea abdita* Williams

Tandinas Shales, by the shore 100 yds. west of the pier, Careg-onen.

FIG. 3. Internal mould of brachial valve with shell material adhering. BB.30588.  $\times 7.1$ .

FIG. 6. Interior of brachial valve. BB.30587.  $\times 7.3$ .

*Palaeostrophomena* sp.

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

FIG. 2. Latex cast of ventral interior. BB.30579a.  $\times 3.2$ .

FIGS. 4, 5. Internal mould and latex cast of brachial valve. BB.30580.  $\times 3.0$ .

*Leptestiina derfelensis* (Jones)

Tandinas Shales, by the track 50 yds. west of Tandinas Quarry, Careg-onen.

FIGS. 7, 8. Internal mould and latex cast of pedicle valve. BB.30577.  $\times 4.0$ .

FIG. 9. Latex cast of dorsal interior. BB.30578.  $\times 4.4$ .

*Bilobia* aff. *musca* (Öpik)

Llanbabo Formation, Llanbabo Church Grits, 180 yds. east of Fferam-uchaf, Llanbabo.

FIGS. 10, 11. Internal mould of pedicle valve, ventral and posterior views. BB.30582.  
 $\times 3.0$ ,  $\times 4.0$ .

FIG. 12. Latex cast of ventral interior. BB.30582.  $\times 3.0$ .

FIG. 13. Internal mould of part of brachial valve. BB.30583.  $\times 3.3$ .

*Eoplectodonta lenis* Williams

Llanbabo Formation, Llanbabo Church Grits, Church Quarry, Llanbabo.

FIGS. 14, 15. Internal mould and latex cast of pedicle valve. BB.30584a.  $\times 4.0$ ,  $\times 3.7$ .

FIG. 16. Internal mould of brachial valve. BB.30585a.  $\times 4.1$ .

FIG. 17. Latex cast of dorsal exterior. BB.30585b.  $\times 4.1$ .

FIG. 18. Latex cast of dorsal exterior. BB.30586.  $\times 4.5$ .





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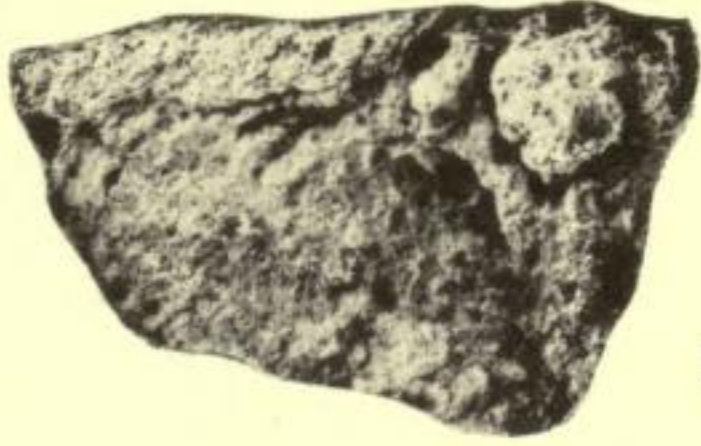
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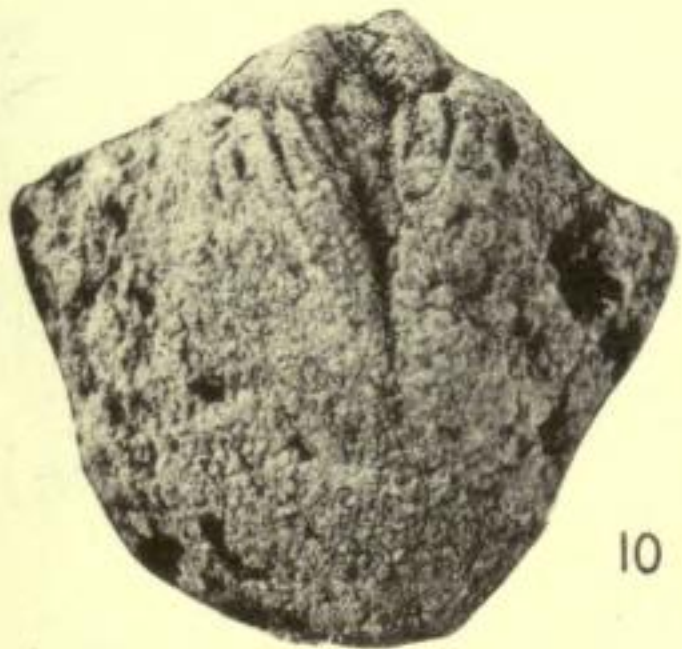
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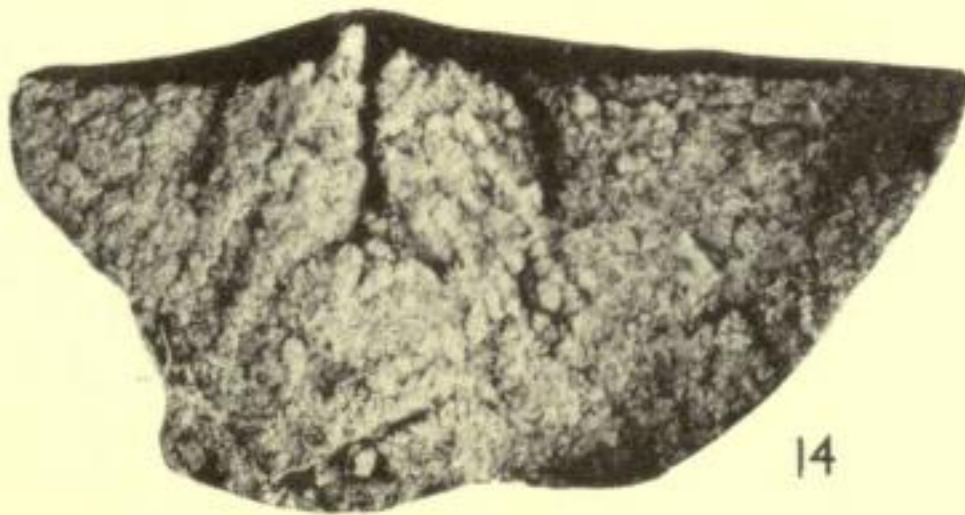
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PLATE 10

*Ptychoglyptus* sp.

Garn Formation, limestone blocks in breccia beds at Porth Padrig, Mynachdy.

FIG. 1. Exterior of brachial valve. BB.30589.  $\times 4.4$ .

FIG. 2. Exterior of pedicle valve. BB.30590.  $\times 4.4$ .

*Leptaena* sp.

Llanbabo Formation, Llanbabo Church Grits, 180 yds. east of Fferam-uchaf, Llanbabo.

FIG. 3. Latex cast of dorsal interior. BB.30592.  $\times 3.2$ .

FIGS. 4, 5. Internal mould and latex cast of pedicle valve. BB.30591.  $\times 2.2$ .

FIG. 6. Internal mould of brachial valve. BB.30593.  $\times 4.5$ .

*Dactylogonia* sp.

Nantannog Formation, fine sandstones and shales 190 yds. south-east of Fferam-uchaf farm, Llanbabo.

FIGS. 7, 8. Latex cast and internal mould of brachial valve. BB.30596a.  $\times 5.6$ ,  $\times 4.6$ .

*Kiaeromena*(?) sp.

Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy.

FIG. 9. Exterior of brachial(?) valve. BB.30595.  $\times 2.9$ .

FIG. 10. Exterior of pedicle(?) valve. BB.30594.  $\times 3.1$ .

*Rectotrophia globularis* gen. et sp. nov.

Treiorwerth Formation, sandstones 300 yds. south-east of Ffynnon-y-mab, Trefor.

FIGS. 11, 12. Internal mould of brachial valve, dorsal and lateral views. Af.1436.  $\times 3.6$ .

FIG. 13. Latex cast of internal mould of brachial valve. Af.1436.  $\times 4.7$ .

FIGS. 14, 15. Holotype, internal mould of pedicle valve, ventral and lateral views. Af.1436.  $\times 3.1$ .

FIG. 16. Holotype, latex cast of ventral interior. Af.1436.  $\times 4.1$ .

FIG. 17. Internal mould of brachial valve. Af.1442.  $\times 4.3$ .

Order uncertain

Torllwyn Formation, sandstones 50 ft. above the base of the succession, on the north side of the faulted syncline, 45 yds. north of Ogof Gynfor, Llanbadrig.

FIGS. 18, 19. Internal mould of brachial valve, posterior and dorsal views. BB.55791a.  $\times 1.5$ .

FIG. 21. Latex cast of brachial valve. BB.55791a.  $\times 2.2$ .

FIGS. 20, 22. Internal mould and latex cast of pedicle valve. BB.55792a.  $\times 1.8$ .

FIG. 23. Latex cast of dorsal exterior. BB.55791b.  $\times 2.1$ .

FIG. 24. Latex cast of ventral exterior. BB.55792b.  $\times 1.5$ .





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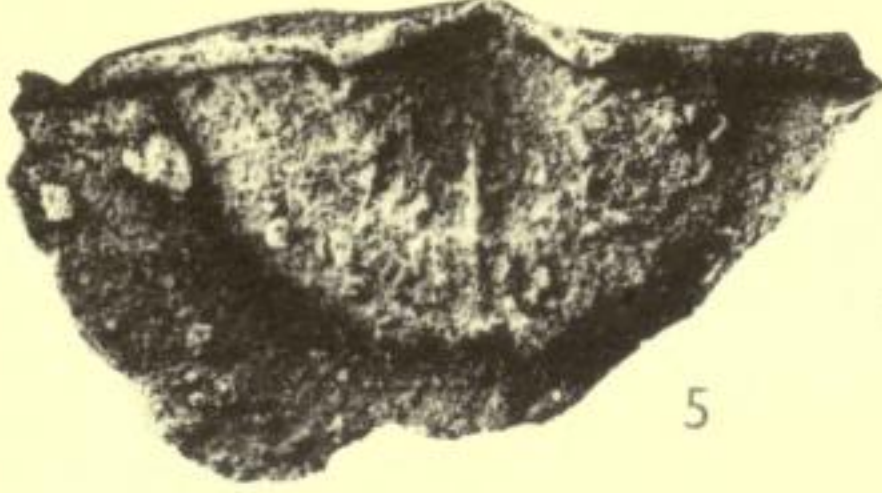
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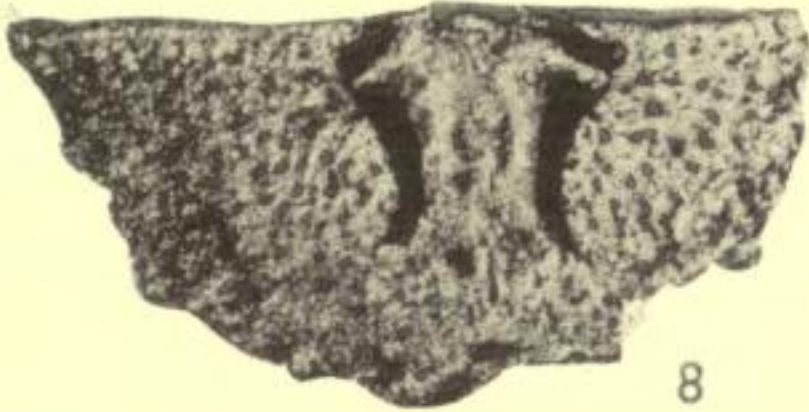
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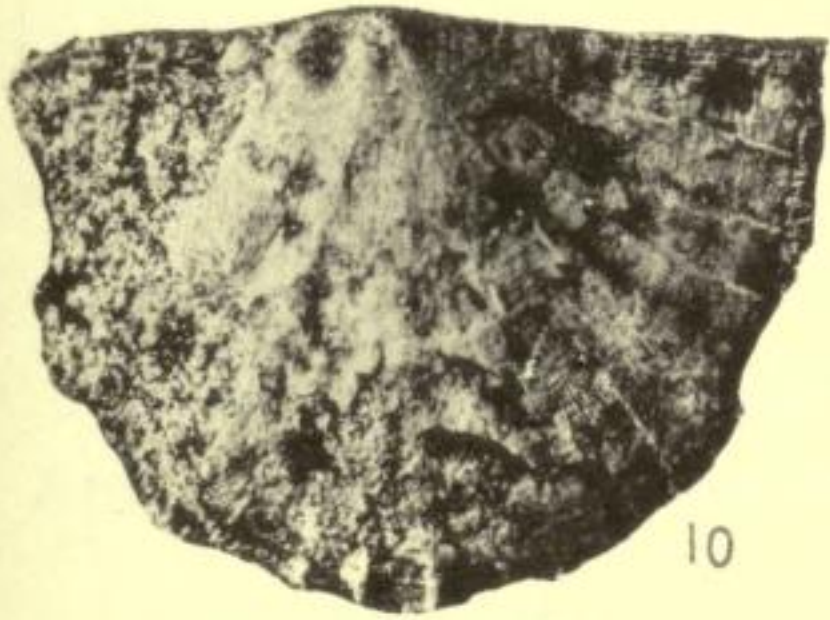
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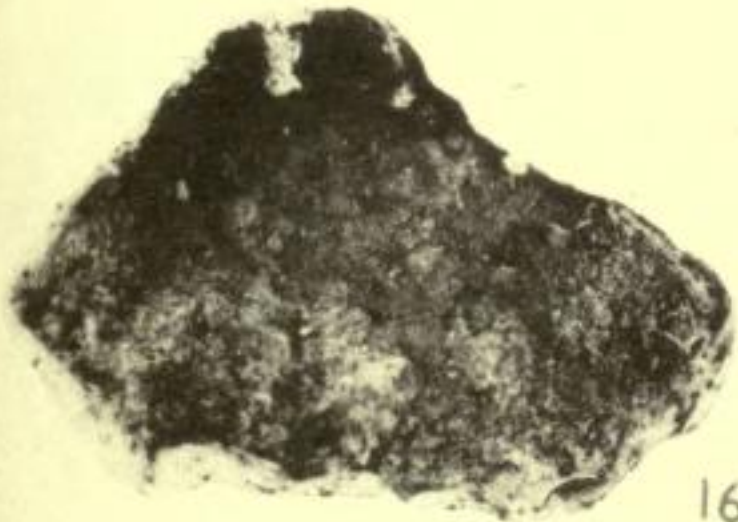
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PLATE 11

*Porambonites* (s.s.) sp.

Treiorwerth Formation, sandstones 300 yds. south-east of Ffynnon-y-mab, Trefor.

- FIGS. 1, 2. Internal mould and latex cast of pedicle valve. BB.30598a.  $\times 1.7$ .  
FIG. 3. Internal mould of brachial valve. BB.30599a.  $\times 1.5$ .  
FIGS. 4, 8. Latex cast of dorsal interior, dorsal and anterior views. BB.30599a.  $\times 1.3$ .  
FIGS. 5, 6. Latex cast and internal mould of brachial valve. BB.30600.  $\times 2.4$ ,  $\times 2.2$ .

*Camerella* sp.

Garn Formation, limestone blocks in breccia beds at Porth Padrig, Mynachdy.

- FIGS. 7, 9, 10, 11. Complete shell, anterior, dorsal, lateral and ventral views. BB.30597.  $\times 4.8$ .

*Metacamerella* cf. *balcletchiensis* (Davidson)

Garn Formation, limestone blocks in breccia beds at Porth Padrig, Mynachdy.

- FIGS. 12, 13, 14. Complete shell, dorsal, lateral and anterior views. Af.1590.  $\times 1.5$ ,  $\times 1.5$ ,  $\times 2.0$ .

*Monella perplexa* gen. et sp. nov.

Carmel Formation, sandstone 400 yds. north of Bryn Gollen Uchaf, Llanerchymedd.

- FIGS. 16, 19. Holotype, internal mould of entire exoskeleton, dorsal and anterior views. Af.827.  $\times 3.0$ .  
FIG. 15. Internal mould of cranidium. Af.836.  $\times 2.4$ .  
FIG. 17. Internal mould of cranidium. Af.834.  $\times 2.5$ .  
FIG. 20. Internal mould of pygidium. Af.839.  $\times 3.1$ .

Carmel Formation, sandstones 50 yds. north-east of Prys-owain-bach, Carmel.

- FIGS. 18, 21. Latex casts of external mould of cranidium and one librigena, and incomplete thorax and pygidium. In.58290.  $\times 1.0$ .



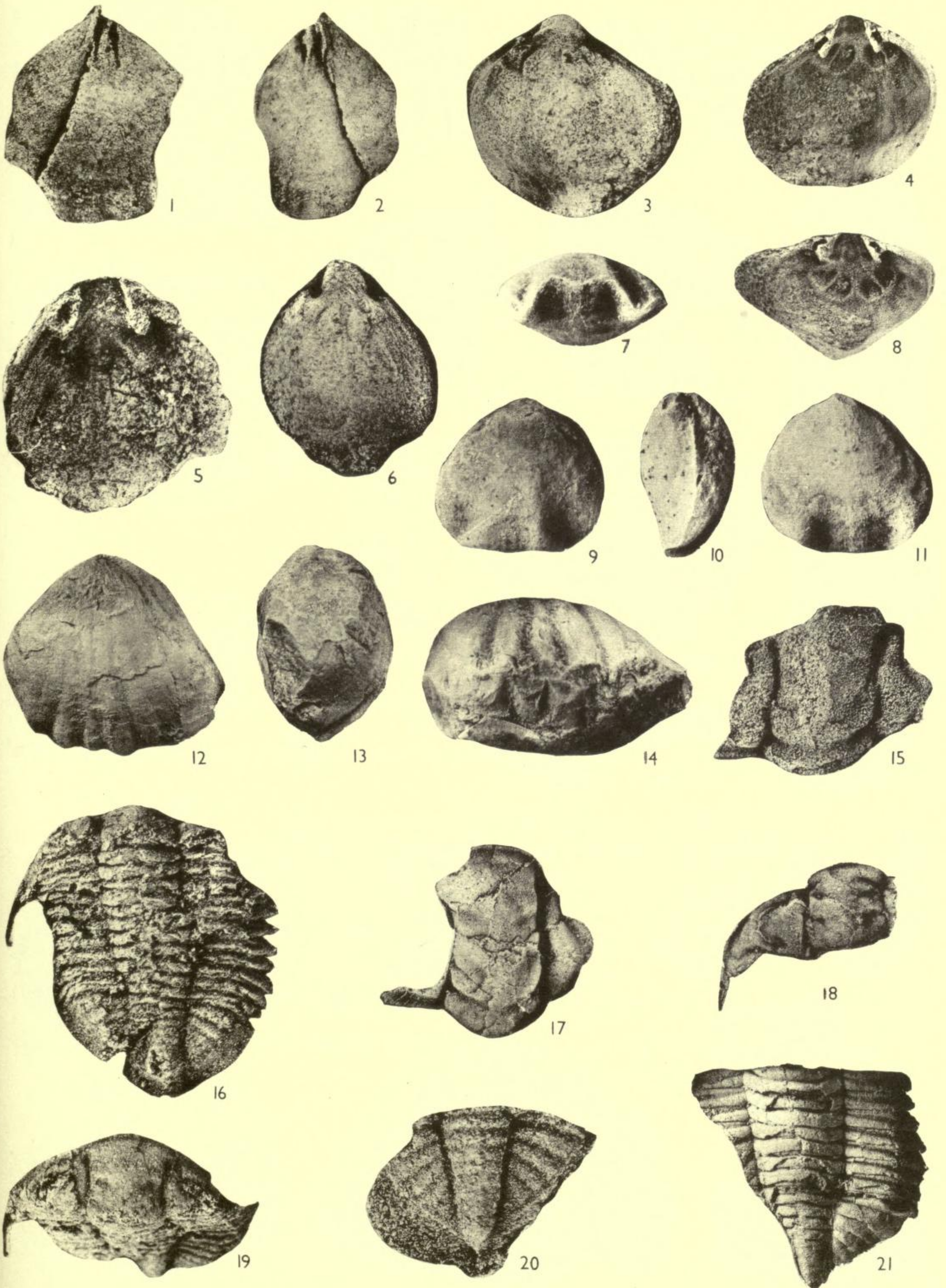




PLATE 12

*Ogygiocaris selwynii* (Salter)

Carmel Formation, sandstones 400 yds. north of Bryn Gollen Uchaf, Llanerchymedd.

- FIG. 1. Internal mould of cranidium. Af.823.  $\times 1.1$ .  
FIG. 2. Internal mould of cranidium. Af.842.  $\times 1.0$ .  
FIG. 5. Internal mould of pygidium. Af.820.  $\times 1.0$ .  
FIG. 6. Internal mould of pygidium. Af.821.  $\times 1.0$ .

*Protobronteus greenlyi* sp. nov.

Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy.

- FIG. 3. Incomplete cranidium. In.58292.  $\times 2.3$ .  
FIG. 4. Internal mould of librigena. In.58293a.  $\times 1.1$ .  
FIG. 7. Holotype, incomplete cranidium. In.58291.  $\times 1.0$ .

*Illaeus* sp.

Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy.

- FIGS. 8, 11, 15. Internal mould of cranidium, anterior, dorsal and oblique views. In.58294.  $\times 2.7$ .  
FIGS. 9, 10. Internal mould of pygidium, with doublure partially revealed, lateral and dorsal views. In.58295.  $\times 1.4$ .  
FIGS. 12, 13. Internal mould of pygidium, with some skeletal material adhering, dorsal and lateral views. In.58296.  $\times 1.1$ .

*Stenopareia* cf. *linnarssoni* (Holm)

Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy.

- FIG. 14. Rostral plate. In.58300.  $\times 2.2$ .  
FIG. 16. Internal mould of librigena. In.58299.  $\times 2.0$ .  
FIG. 17. Internal mould of pygidium, showing the doublure. In.58302.  $\times 2.2$ .  
FIGS. 18, 19. Internal mould of incomplete pygidium, with skeletal material adhering, dorsal and lateral views. In.58301.  $\times 1.1$ .  
FIGS. 20, 21. Internal mould of cranidium, anterior and dorsal views. In.58297.  $\times 2.1$ ,  $\times 3.0$ .  
FIGS. 22, 23. Internal mould of cranidium, with some skeletal material adhering, anterior and dorsal views. In.58298.  $\times 2.1$ .







PLATE 13

*Selenoharpes(?)* sp.

Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy.

- FIGS. 1, 5, 6. Cranidium, dorsal, lateral and anterior views. In. 58303.  $\times 1.6$ .  
FIG. 2. Cranidium, detail of fixigena and brim. In. 58303.  $\times 2.5$ .

*Bergamia(?)* sp.

Shales, *D. bifidus* zone, quarry 100 yds. north of Gwredog-uchaf, Rhodogeidio.

- FIG. 3. External mould of complete dorsal carapace. In. 58305b.  $\times 8.0$ .  
FIG. 4. Internal mould of dorsal carapace lacking the librigenae. In. 58306.  $\times 1.3$ .  
FIGS. 9, 13. External and internal moulds of cranidium and pygidium. In. 58304.  $\times 4.4$ .

*Ampyx* sp. (1)

Carmel Formation, sandstones on scarp west of Bryn Gollen Uchaf, Llanerchymedd.

- FIG. 8. Internal mould of cranidium. Af. 824.  $\times 3.8$ .

*Ampyx* sp. (2)

Tandinas Shales, by the track 50 yds. west of Tandinas Quarry, Careg-onen.

- FIG. 7. External mould of cranidium. In. 58308.  $\times 3.2$ .  
FIG. 10. Internal mould of thoracic segments and pygidium. Af. 3653.  $\times 2.0$ .

Tandinas Shales, on the shore by the power house, 100 yds. west of the pier.

- FIG. 11. Internal mould of cranidium. In. 58307a.  $\times 1.7$ .  
FIG. 12. Latex cast of external mould of pygidium. In. 58309.  $\times 3.0$ .

*Ceraurinella* sp.

Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy.

- FIG. 14. Incomplete cranidium. In. 58312.  $\times 2.2$ .  
FIG. 15. Glabella. In. 58311.  $\times 3.2$ .  
FIG. 16. Glabella. In. 58310.  $\times 3.2$ .  
FIG. 17. Hypostome. In. 58315.  $\times 2.4$ .  
FIG. 18. Latex cast of external mould of thoracic segment. In. 58316.  $\times 2.1$ .  
FIG. 19. Thoracic segment. In. 58317.  $\times 2.2$ .  
FIG. 20. Pygidium. In. 58318.  $\times 4.0$ .  
FIG. 21. Hypostome. In. 58313.  $\times 1.6$ .  
FIG. 22. Hypostome. In. 58314.  $\times 3.2$ .



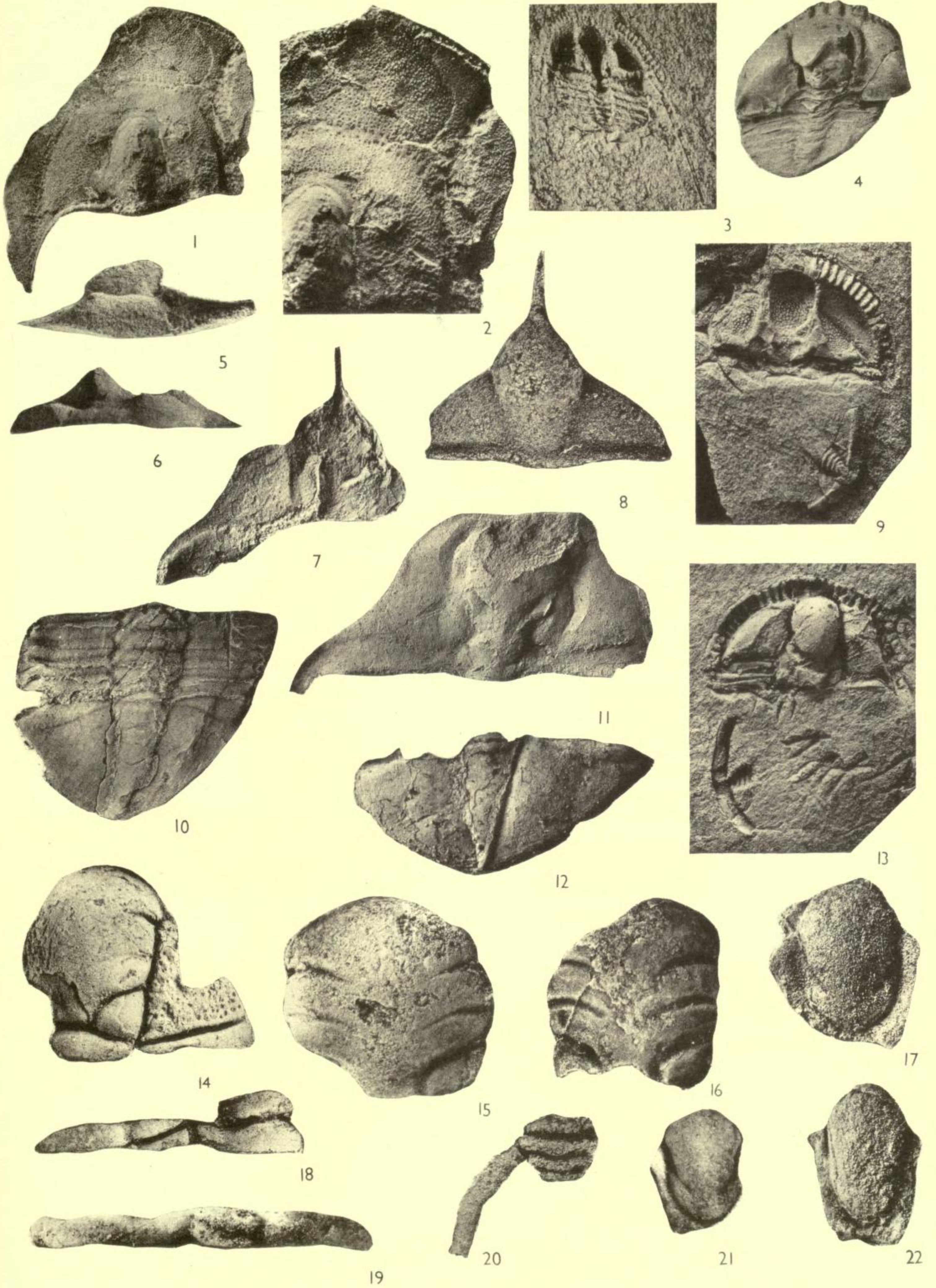




PLATE 14

*Sphaerexochus* sp.

Tandinas Shales, on the shore by the power house, 100 yds. west of the pier, Careg-onen.  
FIGS. 1, 2. Cranidium, dorsal and oblique lateral views. In. 58319.  $\times 3.2$ .

*Pliomerops* sp.

Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy.

- FIG. 3. Hypostome. In. 58321.  $\times 1.8$ .  
FIG. 4. Incomplete cranidium. In. 58320.  $\times 2.2$ .  
FIG. 6. Incomplete pygidium. In. 58322.  $\times 1.3$ .  
FIG. 7. Latex cast of external mould of pygidium. In. 58323b.  $\times 2.0$ .

*Placoparia* sp.

Shales on the shore at Porth-y-gwichiaid, 80 yds. north of the streamlet.

- FIG. 5. Complete dorsal carapace, lacking the librigenae. Af. 1319.  $\times 2.6$ .

*Calymenid* (s.l.) sp.

Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy.

- FIG. 8. Hypostome. In. 58324.  $\times 3.1$ .  
FIGS. 9, 12, 13. Pygidium, dorsal, posterior and oblique lateral views. In. 58325.  $\times 2.8$ .

*Neseuretus monensis* (Shirley)

Carmel Formation, sandstones 120 yds. north-west of Chwaen-bach, Llanerchymedd.

- FIG. 11. Internal mould of pygidium. In. 58327.  $\times 1.7$ .  
Carmel Formation, sandstones 440 yds. north of Ty-hen, Treiorwerth.  
FIG. 16. Internal mould of pygidium. In. 58326a.  $\times 1.7$ .

*Amphilichas* sp. (1)

Garn Formation, limestone blocks in breccia beds, Porth Padrig, Mynachdy.

- FIGS. 10, 14, 17. Cranidium, anterior, lateral and dorsal views. In. 58328.  $\times 2.0$ .  
FIG. 15. Hypostome. In. 58329.  $\times 3.3$ .

*Amphilichas* sp. (2)

Tandinas Shales, by the track 50 yds. west of Tandinas Quarry, Careg-onen.

- FIGS. 18, 19. External mould and latex cast of cranidium. Af. 3000.  $\times 2.1$ .



